

MODERN Machine Shop

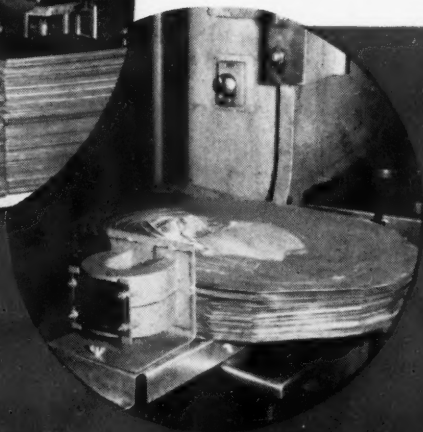
AUGUST, 1951

FLOAT THAT STEEL...
and save time, money and manpower



Above—12" Sheet Floaters used on rectangular sheets. Right—6" Sheet Floater used to separate blanks. Note that operator can grasp the edge of the sheet and pull it towards himself in one quick, natural motion.

TRADE **Verson** MARK
SHEET FLOATERS
speed separation
of stacked steel sheets
and blanks



VERSON ALLSTEEL PRESS CO.

9310 S. KENWOOD AVENUE

CHICAGO 19, ILLINOIS

MECHANICAL AND HYDRAULIC PRESSES AND PRESS BRAKES • TRANSMAT PRESSES
TODDING • DIE CUSHIONS • COMPRESSION AND TRANSFER MOLDING PRESSES



When production lines shift to defense,
the PROVED DEPENDABILITY of Heald machines
helps to KEEP 'EM ROLLING

There's no room for weak links in the chain of operations that makes up your production line — especially when you're tooling up for vital defense orders. That's where Heald's extra dependability and proved precision can help you off to a good start — and keep production rolling around the clock.

The new Heald Bore-Matics and grinding machines have won their service stripes in the most competitive fields of highly mechanized

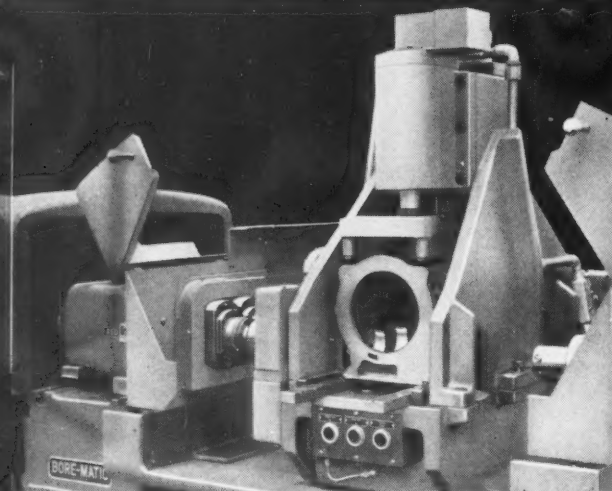
production — setting enviable records for speed, efficiency and dependability. This background of proved performance — plus Heald's unequalled engineering experience in all fields of precision finishing — can smooth the way for faster, easier conversion, and sustained production that will meet the most exacting requirements.

Remember — when it comes to precision finishing, it pays to come to Heald.

Heald Bore-Matic Setup
Increases Efficiency of
Automotive Conveyor Line

HERE'S WHY

1. **Basic Dependability** — sound design and reliable cycle functions provide the maximum in uninterrupted production.
2. **Correct Working Height** — combines ease of operation and loading with required level for conveyor setup.
3. **Convenient Operation** — automatic operating cycle and fixture equipment controlled by push buttons.



This double-end Heald Bore-Matic is an integral link in a fast-moving automotive conveyor line, boring cross holes in transmission housings.

THE HEALD MACHINE COMPANY
WORCESTER 6, MASSACHUSETTS



Branch Offices: Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York

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MODERN Machine Shop Contents

Features in This Issue	83
Machining the Fordomatic	84
Welding the Navy's Warplanes.....	100
By Howard E. Jackson	
Production Operations on Buda Diesel Truck Engines, Part II.....	108
By J. Broberg	
Handling Precision, Self-Lubricating Bearings.....	130
By Gilbert C. Close	
Safe Lifting is Everybody's Business.....	136
Designing Drawing and Redrawing Dies.....	154
By C. W. Hinman	
Processing Titanium	168
By Frank Charity	
Rheem Supplies Containers for Jet Engine "Canning".....	180
Little Chats on Practical Psychology.....	190
Modern Equipment at Work	
—Turret Punch Press Saves Time in Sheet Metal Parts Production	194
—Hot-Forming Machines Aid in Economical Production of Tubular Parts	196
—Continuous Carbon Correction Annealing Furnace Effects Steel Saving at Union Drawn.....	198
—100 Cylinder Blocks per Hour Handled on Special Machine Tool	200
—Small Redesign of Cast Steel Hook Effects Large Savings in Production Cost.....	200
—Machine Automatically Inserts Springs in Clutch Plate Cavities	204
Ideas from Readers	
—Driving Dog for Steady Rest Work.....	208
By F. E. Riley	
—Step-Type Gage Aids in Setting Up End Mill.....	210
By Irwin Mansfield	
—Automatic Vellum Roller	214
By Gilbert C. Close	
—An Unusual Fixture for Milling a Woodruff Keyway.....	218
By Robert Mawson	
—Equalizing Clamp	226
By F. A. Adams	
News of the Industry.....	230
New Shop Equipment	292
Services Directory	350
"Where to Get It"	352
Cartoon	360
Over the Editor's Desk	362
Index to Advertisements	364

For MAINTENANCE and JOBBING

The LITTLE LANDIS Pipe Threading & Cutting Machine

designed for threading bolts and for cutting off and threading pipe in maintenance and jobbing shops, is illustrated producing bolt threads for use in maintenance work. This machine can handle a variety of work at a minimum cost, permit the quickest possible set-up changes, and produce cleanly-cut and well-formed threads on all materials.



• The $\frac{3}{4}$ " and 2" Landis Stationary Die Heads, standard equipment with the LITTLE LANDIS, give rapid flexibility in cutting pipe threads within a range of $\frac{1}{4}$ " to 2" and bolt threads $\frac{1}{4}$ " to $1\frac{1}{4}$ " or $\frac{3}{8}$ " to $1\frac{1}{2}$ ". They are equipped with the Landis Tangential Chaser, acclaimed "the finest thread cutting tool in industry."

Write for Bulletin C-82

LANDIS
MACHINE COMPANY
WAYNESBORO, PA., U.S.A.



STOP DUST MENACE

WITH *Hammond*
DUSKOLECTORS

DUST CONTROL A MUST!

Progressive manufacturers, Production Managers and State Health Inspectors all agree that dust laden air

- (1) Impairs employee health
- (2) Reduces employee efficiency
- (3) Ruins valuable machinery



CYCLONE TYPE

1/2 HP, 1 HP, and
1 1/2 HP.



MODEL 50 - 1 HP, 1000 CFM.

Hammond DUSKOLECTORS will solve your dust problem. Recommended for tool grinding, general grinding and for polishing operations, etc., etc.

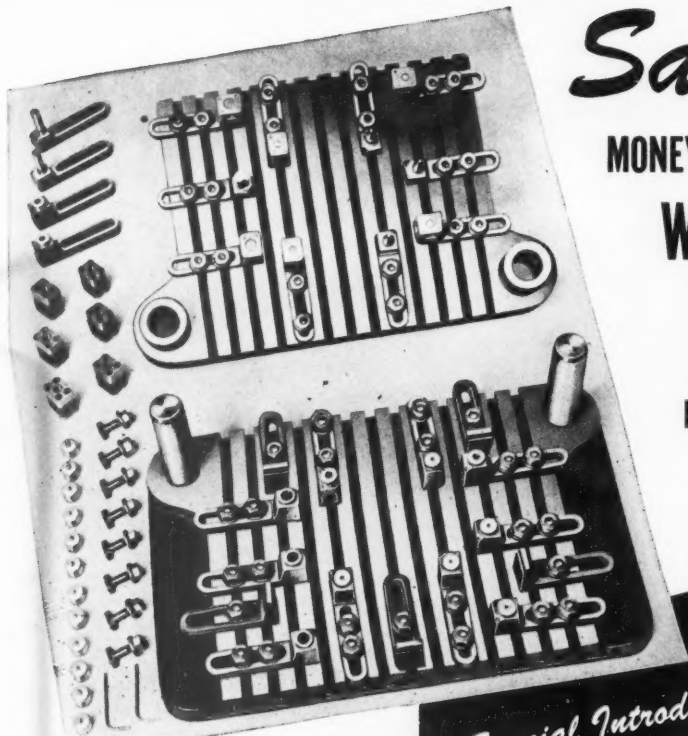
CABINET TYPE—1/4 HP, 1/2 HP, and 1 HP.

Write for folder and complete information.



Hammond Machinery Builders
INC.

1615 DOUGLAS AVENUE • KALAMAZOO, MICHIGAN



A MONEY-SAVING opportunity to prove in your own plant the many advantages of Whistler Adjustable Dies. Now being employed by thousands of metal working shops. The compact design of this special U-375 unit (10" x 12" working surface) provides up to 25 holes, $\frac{1}{32}$ " to $\frac{3}{8}$ " diameter. Pierce materials up to and including $\frac{1}{16}$ " mild sheet steel...in one operation. Minimum centers of $\frac{7}{8}$ " are permitted. Set-ups are made quickly and into production within hours. Precision perforating on long or short runs at much reduced expense. Re-use of punches and dies writes off first cost. The U-375-unit is shipped complete ready for immediate set-up.



Save TIME AND MONEY WITH THIS NEW

WHISTLER U-375

ADJUSTABLE PERFORATING DIE SET

Special Introductory Offer

To prove the advantages of Whistler Adjustable Dies under your production conditions, we are offering these U-375 units at a special low price.

- | | |
|---------------------------|----------------------------|
| 1 DS-1012-1 (10" x 12") | 12 DBU-375 Die Bushings |
| 1 T Slotted Die Set | 12 S-375 Strippers |
| 12 DR-375 Die Retainers | 12 LLP-375 Locating Pilots |
| 12 PR-375 Punch Retainers | 4 GA-375 Standard Gauges |
| 12 PU-375 Round Punches | 1 SUP-375 Set-Up Plug |

Punches and dies are your own selection of sizes from $\frac{1}{32}$ " up to $\frac{3}{8}$ " diameters. Everything needed to start production is included.

Shipped complete upon receipt of your order for only

\$280

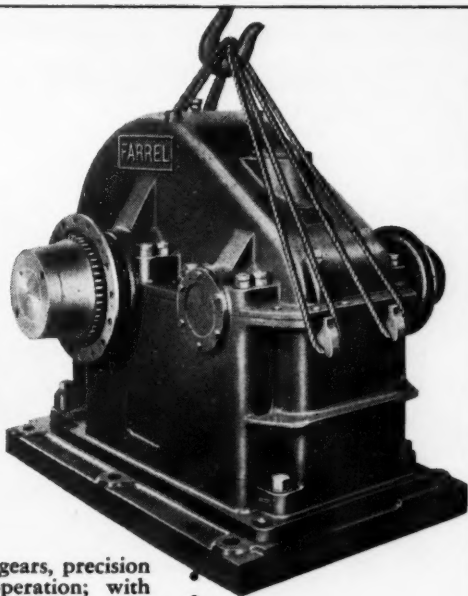
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SENT FREE ON REQUEST—Special U-375 Booklet and General Catalogs. In brief informative style, with clear-cut illustrations, this literature gives complete details about Whistler Adjustable Dies. Write today.

S. B. WHISTLER & SONS, Inc.

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THEY ARE MADE with Farrel-Sykes gears, precision generated for smooth, quiet operation; with shafts and bearings factored to safeguard against interruption of vital processes; with gear cases proportioned to withstand repeated heavy peak loads. These are standard features of design, incorporated to assure long, trouble-free performance under normal operating conditions.

FOR UNUSUALLY SEVERE SERVICE, THEY ARE MADE with gears, shafts, bearings, and even some housing dimensions, proportioned to meet specific load, speed and operating conditions. Because of this flexibility in design, Farrel speed reducers have provided the solution to innumerable application problems.

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are made
to fit your
requirements

FB-681

FARREL-BIRMINGHAM COMPANY, INC.
ANSONIA, CONNECTICUT

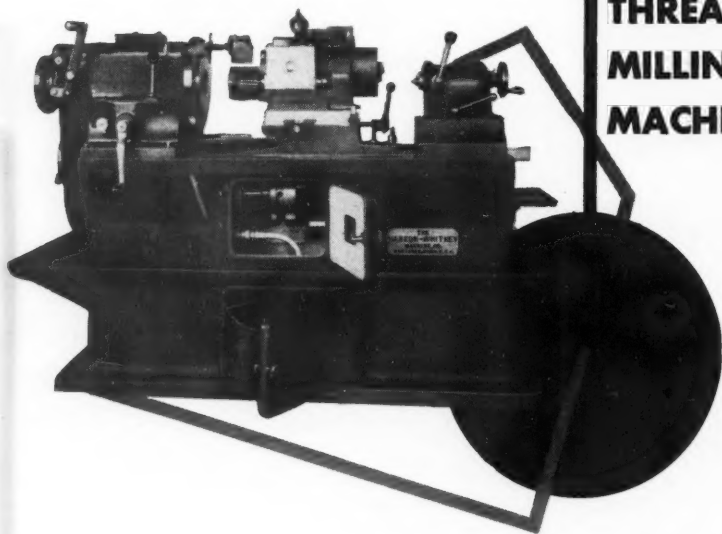
Plants: Ansonia and Derby, Conn., Buffalo, N. Y.
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PERFECT THREADS external or internal

NO SPOILAGE with

**Hanson-Whitney
THREAD
MILLING
MACHINE**



Today's requirements for low cost, perfect threading of so many, so varied and such costly metal parts make it necessary that work spoilage be eliminated.

The "Milling Process" . . . and, in particular, the Hanson-Whitney Semi-Automatic Thread Milling Machine . . . gives you 100% perfect threads. And it produces at high speeds on many materials, otherwise difficult to machine.

Because of the Multiple Cutter principle used, threads of varied lengths are completed in one revolution of the work. Threading may be right

or left hand, external or internal, straight or tapered. All operations are automatic except insertion and removal of work.

Three machine sizes permit External Threading from $\frac{1}{4}$ " to 10" dia.; Internal Threading $\frac{3}{4}$ " to 10" dia. The size pictured above (the largest) has a capacity of 10" dia. x 24" length.

For low-cost, perfect threading select the H-W Thread Miller . . . a standard of highest quality throughout the industrial world.

SPECIAL BULLETINS ON REQUEST

HANSON-WHITNEY COMPANY, HARTFORD 2, CONN. • Division of The Whitney Chain Company

**Hanson
Whitney**
PIONEERS OF FINISHED TAPS

CHWBB

MULTIPLE-USE RUBBER-CUSHIONED ABRASIVES SHOW BIG TIME-SAVINGS; STIMULATE NEW PRODUCTION METHODS

THE increasing use of rubber-cushioned abrasives for finishing products, assemblies, parts, in lightweight and semi-precious metals, laminated materials, plastics, wood, glass, is providing rapidly widening finishing opportunities in today's changing production picture.

Working results show time savings as much as 50%; outstanding surfacing and smoothing; burring, finishing, cleaning and polishing in one operation—a boon to plants adding defense work.

Mounting overhead, possible labor shortages, work on new products in new materials, have faced manufacturers with the problem of finding improved finishing methods. Production men familiar with the conventional finishing uses of rubber-cushioned Brightboy abrasives are discovering the extensive applications of this multiple-use product to special finishing. Rubber and abrasive, working together, produce a unique surfacing-smoothing-polishing action. It is relatively "light" and can be controlled by pressure and/or speed of the Brightboy wheel, rod, stick or block employed in the machine or manual operation involved.

TIME IS SAVED

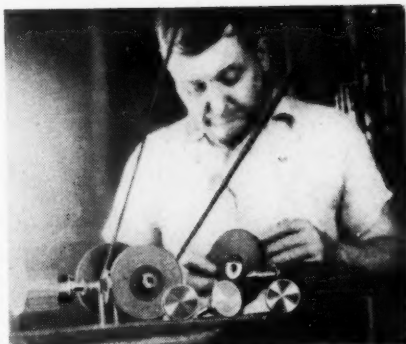
Experts in the development and use of rubber bonded abrasives are enthusiastic about their extensive versatility, asserting that they bring an entirely new and much broader concept to finishing. Brightboy will bridge the gap, the work steps, between the rough grind and the buff—frequently in one operation. It often serves for the final polish, can be shaped to surface contours, and used for close tolerance, precision work. It requires no before-use preparation or dressing, no skilled labor to handle it. As a result, time savings are automatic.

A FEW OF MANY BROAD USES

Removing light digs, tool and heat marks. Cleaning welded and soldered joints. Finishing dies and molds. Burring and finishing stampings, castings, machined and molded parts.

SPECIAL USES

Cover a wide range of applications. Already proved in defense manufacture



and maintenance of ordnance, internal combustion and jet engines, airplane parts, electrical and electronic equipment, transportation equipment, instruments—and the production of basic tools, dies, molds, jigs, patterns, etc.

NOTE TO PRODUCTION AND METHODS MEN:

Brightboy Industrial Division of the Weldon Roberts Rubber Co. offers a brief manual containing detailed information on the uses of rubber-cushioned abrasives, also production recommendations on problems where abrasive finishing methods or production are involved or highly specialized. Address Brightboy Industrial Division, Weldon Roberts Rubber Co., 6th Ave. & No. 13th St., Newark 7, N. J. (Products of the Brightboy line are stocked by mill supply dealers in leading cities.)



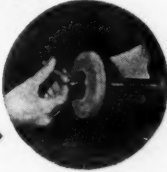
← Brightboy Rod in drill press, burring and polishing inside of guide hole.



Cleaning and smoothing of threads with Brightboy Hand Tablet.



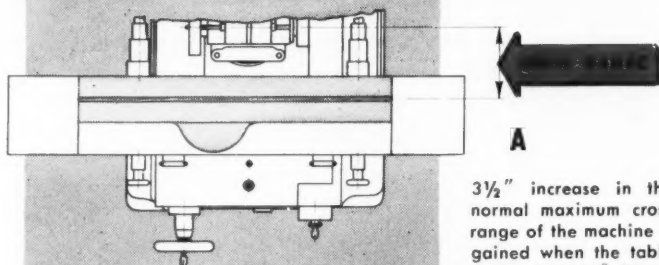
← Polishing base of elbow tube with Brightboy Wheel.



Smoothing and burring dural and stainless steel parts with Brightboy Wheel.

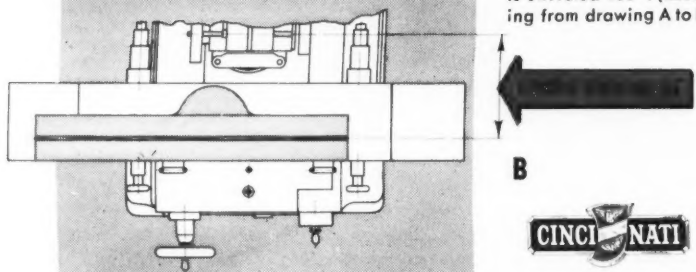
NEED MORE RANGE

to grind your larger



A

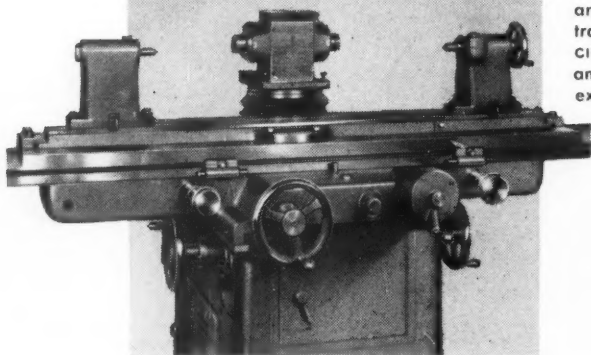
3½" increase in the normal maximum cross range of the machine is gained when the table is swiveled 180°. (Reading from drawing A to B)



B



Heavy Duty Tailstocks and extra long table traverse equip this CINCINNATI No. 2 Cutter and Tool Grinder for extra large work.



CIN

CINCINNATI No. 2 Cutter and Tool Grinder. Complete information may be obtained by writing for catalog No. M-1734.

cutters?

In the average shop most cutters are ground on a No. 2 size machine. But the inevitable always happens; sooner or later a cutter shows up that requires more range than available. ¶If you have CINCINNATI No. 2 Cutter and Tool Grinders in your shop,

here's a way to get greater cross range that may have escaped your attention: just swivel the table 180°. It's like this—the table is pivoted 1¾" off center from the T-slot, and when it's swiveled 180°, 3½" is gained in the maximum dimension from the T-slot to the center of the grinding wheel spindle (see drawing). ¶The way to obtain increased table traverse and/or swing is to specify it when you order the machine. CINCINNATI No. 2 Cutter and Tool Grinders may be equipped with 36" table travel and heavy duty tailstocks for 16" diameter swing. ¶Many other advantages are offered by these machines. All are outlined in a new, profusely illustrated catalog, No. M-1734. A copy is yours for the asking.



THE CINCINNATI MILLING MACHINE CO., CINCINNATI 9, OHIO

CINNATI

MILLING MACHINES • CUTTER SHARPENING MACHINES • BROACHING MACHINES
FLAME HARDENING MACHINES • OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

QUICKEST ROUTE

**to
high production
at nominal cost**

Handles work up to 1¼" O.D.

**PROMATIC
CENTERLESS
GRINDER**

If your centerless grinding jobs are common sizes—1¼" OD or less—you'll get the production you need on a PROMATIC—and you'll save many dollars in first cost! PROMATIC delivers the output, the mirror finishes and holds those split-hair tolerances demanded by quality operations.

PROMATIC craftsmanship is equal to the best . . . size is convenient to use . . . cost is lower than you would ever dream!

Why not get the facts on PROMATIC? It's built for *precision, value, savings!*



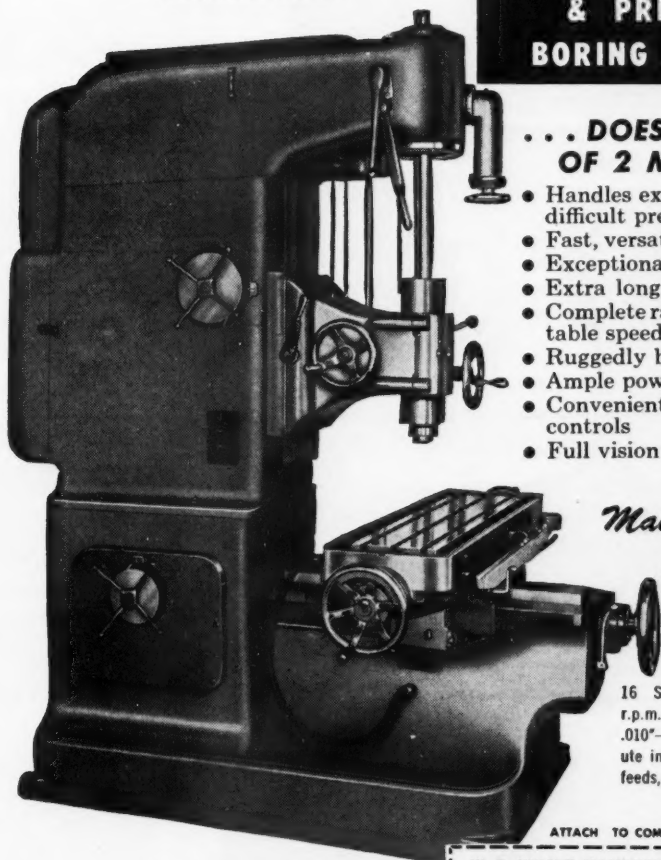
**DIVERSIFIED METAL
PRODUCTS CO.**

5125 Alcoa Ave., Los Angeles 58, Calif.

✓ CUTS SETUP TIME!

✓ ELIMINATES WORK
TRANSFERS!

KNIGHT
NO. 50
VERTICAL MILLING
& PRECISION
BORING MACHINE



**... DOES THE WORK
OF 2 MACHINES!**

- Handles extreme range of difficult precision work
- Fast, versatile, easy operation
- Exceptional cross table travel
- Extra long spindle travel
- Complete range of spindle and table speeds and feeds
- Ruggedly built for accuracy
- Ample power for tough jobs
- Convenient quick-action controls
- Full vision work areas

*Mail Coupon
NOW!*

16 Spindle speeds, 40 to 2000
r.p.m.—9 Spindle feeds, .0005" to
.010"—100" rapid traverse per min-
ute in both directions—16 Table
feeds, 5/16" to 20" per minute.

ATTACH TO COMPANY LETTERHEAD

W.B. KNIGHT
MACHINERY COMPANY



3920 West Pine Blvd.
St. Louis 8, Missouri

W. B. KNIGHT MACHINERY COMPANY
3920 West Pine, St. Louis 8, Mo.
Send catalog on No. 50 and other Knight Milling
Machines.

NAME

TITLE

LANDIS TOOL Precision Grinders for your

UNIVERSAL GRINDERS

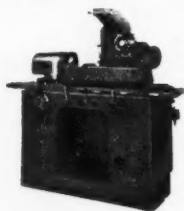
*Production
Tool Room
Maintenance
Training*



Grindwell



12 x 28 Universal & Tool

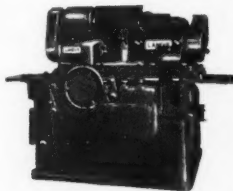


10 x 20 Type H Universal

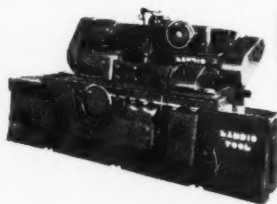
HIGH PRODUCTION PLAIN GRINDERS



4" Type H Plain



6" Type CH Plain

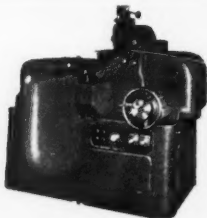


10" Type CH Plain

CENTERLESS HIGH PRODUCTION GRINDER

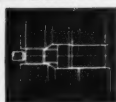
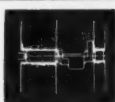
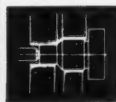
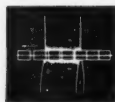


No. 12 Centerless

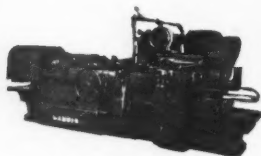


No. 12 Centerless

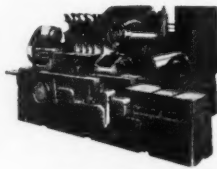
operation sketches



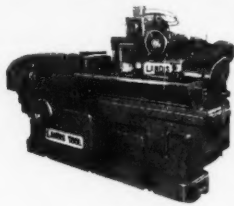
SPECIAL PURPOSE GRINDERS



Crank Pin



Multiple Wheel



Cam Contour

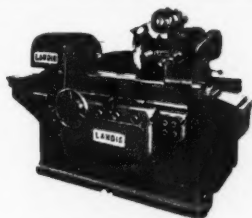
engineered grinding service

LANDIS TOOL precision grinders are easily modified for special jobs. Typical examples of these modifications are raised work centers so that work with large projections may be ground, angle wheelbases for grinding outside

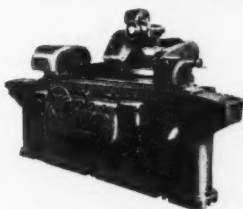
diameters and faces in one operation and special operating cycles for maximum production of specialized work pieces. On the basis of your blueprints, our engineers will give you production estimates and tooling recommendations.

Cylindrical Grinding needs

**HEAVY STOCK REMOVAL
HIGH PRODUCTION
COST REDUCTION
FINE FINISH
CLOSE TOLERANCE**

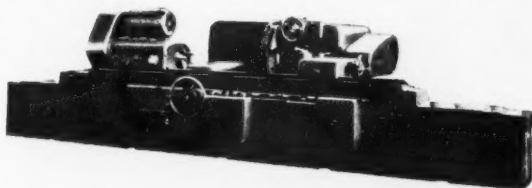
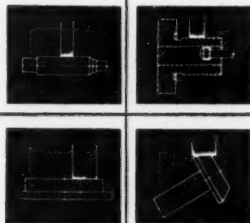


10" x 24" Type CH Universal



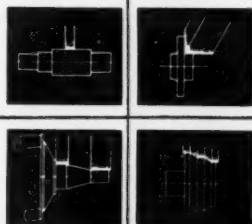
12" Type CH, 14"-18" Type C Universal

operation sketches

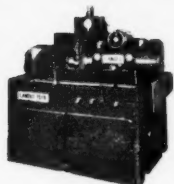


Type F Plain

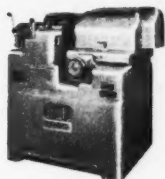
operation sketches



LANDIS TOOL

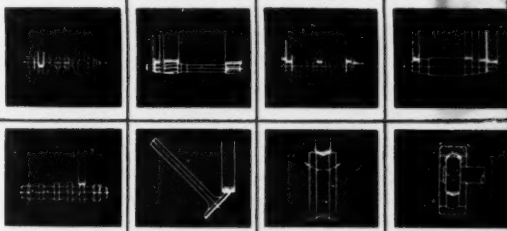


Valve Face



Ball Race

operation sketches



optional features available

Automatic cycles
Loading fixtures
Work holding fixtures
Wheel base mounted wheel dressers

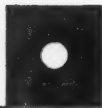
Hydraulic rapid infeed
Rapid wheel positioning
Automatic sizing
Profile wheel dressers

120 S



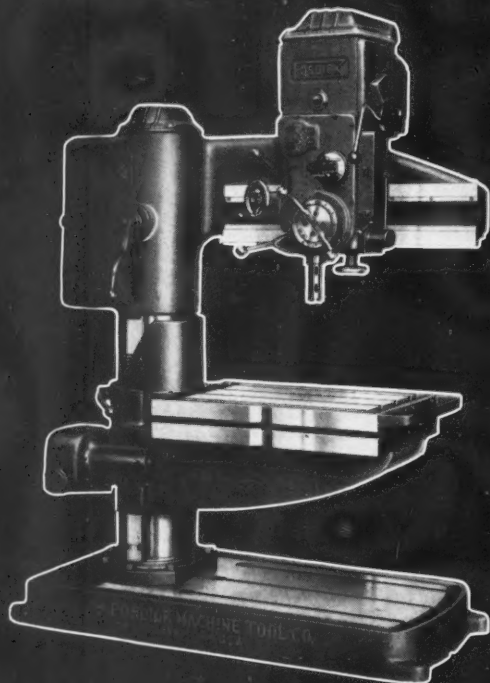
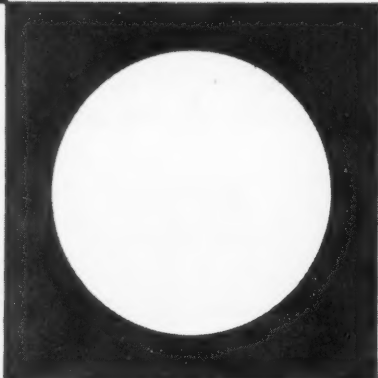
**microsphere bearing
equipped for accuracy**

this hole ▶



◀ this hole

or this hole ▶



can be drilled faster,
better and at less cost
with a

FOSDICK *Sensitive* RADIAL

Unique design of the Fosdick Sensitive Radial gives you sensitive drilling plus rugged radial operation on holes up to 1½". Sizes: 3' and 4', 12" column. Features: Adjustable table swings 360°; Nine speeds, four feeds; All controls *always* convenient to operator. Write today for bulletin SR MMS.

THE FOSDICK MACHINE TOOL CO.
CINCINNATI 23, OHIO

FOSDICK

**CUSTOM
MADE
at NO
EXTRA
CHARGE**



ACCURATE
SQUARES

CONCENTRIC
SHANKS

UNIFORM
FLUTE
SPACING

CONTROLLED
HOOK

PRECISION
GROUND
CHAMFER

Jarvis

TECNI-TAPS



You pay nothing extra for having Jarvis Tecni-Taps custom made. Depth and width of flutes, hardness, hook, proper chamfer and other vital factors are carefully determined by qualified Jarvis personnel. The result — a ground-from-the-solid Tecni-Tap that gives you the maximum in accurate, long-lived, trouble-free service.

Call in the Jarvis factory-trained service engineer. He will gladly help you with your tapping requirements — show you how Jarvis custom-made Tecni-Taps can save you money and increase productivity.

For additional literature, write: The Charles L. Jarvis Co., Middletown, Connecticut.

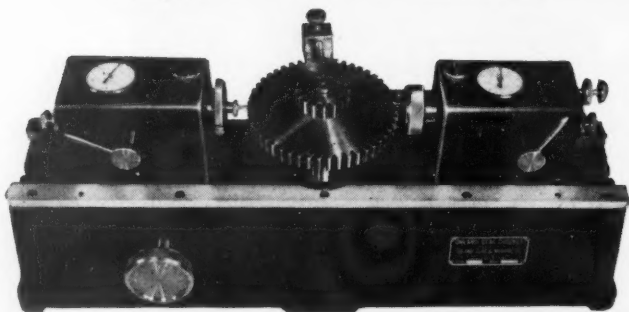
Jarvis
**POWER
TOOLS**

TAPPING ATTACHMENTS • TECNI-TAPS and DIES • ROTARY FILES
FLEXIBLE SHAFTS and MACHINES • QUICK CHANGE CHUCKS and COLLETS

THE CHARLES L. JARVIS CO., MIDDLETOWN IN CONNECTICUT

ORLANDI *Gear Checker*

Simple • Fast • Accurate



MAKES GEAR CHECKING SO FAST AND INEXPENSIVE YOU CAN USE IT AT EVERY PRODUCTION STAGE, BLANK TO FINAL, AND REDUCE THE COST OF SCRAP!

CHECKS P. D. (with pins or balls) of spur, helical and worm gears . . . **CHECKS** concentricity (no master req'd) of spur, helical (R. or L.) and worm gears . . . **CHECKS** parallelism of spur gears . . . **CHECKS** helix angles . . . **CHECKS** tooth spacing, tooth to tooth or 180° . . . **CHECKS** concentricity of gears also with masters as a rolling fixture . . . **CHECKS** backlash with mating gears with rolling fixture attachment or pins . . . **CHECKS** P. D. of any thread form with 3 wires.

ORLANDI GEAR & MACHINE CO.

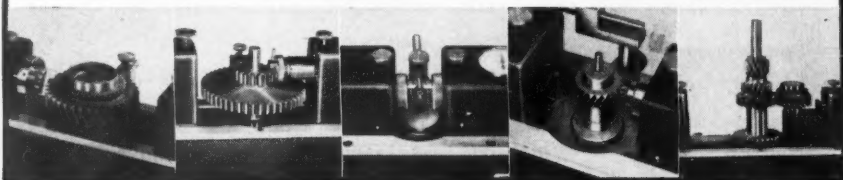
Manufacturers of fine pitch precision gears
16195 Meyers Rd. • Detroit 35, Mich.

Condensed list of users
Addressograph-Multigraph
Borg-Warner Corp.
Caterpillar Tractor
Chrysler Corporation
Ford Motor Co.
General Motors Corp.
International Harvester
Mass. Institute of Tech.
U. S. Slicing Machine Co.
U. S. Arsenals
Westinghouse Electric

3 MODELS:

0"- 6" P.D. \$1175
0"- 10" P.D. \$1550
0"- 15" P.D. \$1965

Attachments Extra
Larger models on special order.



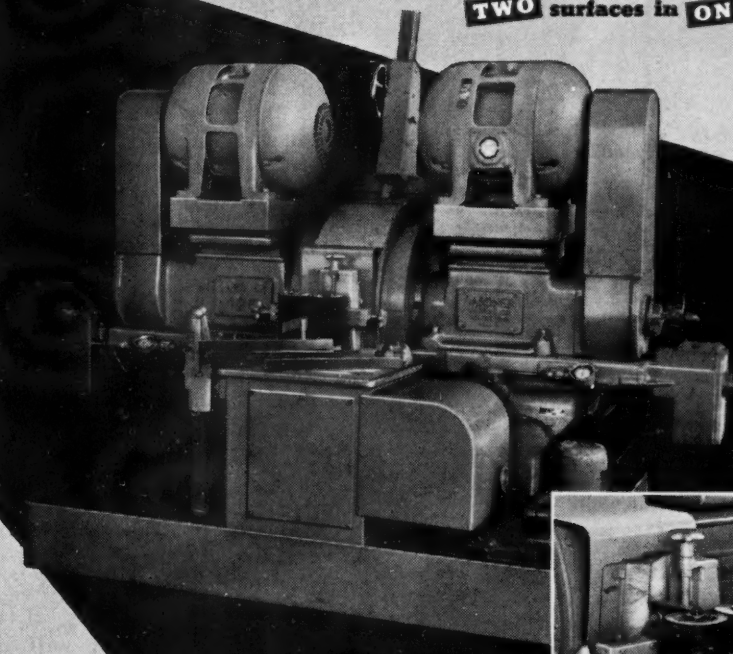
GARDNER



13 Feet Per Minute Parallel Face Grinding of Steel Strips

Production increased by grinding

TWO surfaces in **ONE** operation

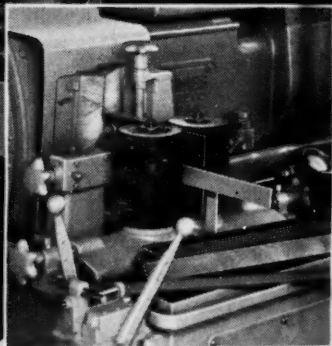


480 pieces per hour—up to .015"
over-all stock removal, limits
.002" for uniformity, .001" for
parallelism on Gardner 125-26"
Double Disc Precision Grinder



Request bulletin No. 12-7.

106MS



Hand feed to power-operated
adjustable roll feed-thru fixture.

GARDNER MACHINE COMPANY

428 East Gardner Street • Beloit, Wisconsin, U. S. A.

LOOK HARD!! YOU WON'T FIND BETTER SHAPES

*Your problems are solved
with the Pedrick
Production
Bender*



For bending pipes, tubes, strips, shapes and bar stock — you may depend on the Pedrick Production Bender for accuracy, uniformity — speed and economy. It is equipped with relay controls for semi-automatic duplicate bending and bends pipe up to 6" extra heavy, has no clamps thus eliminating costly tools — needs no special skill.

Inasmuch as the machine is very inexpensive, the bending cost per piece is very low. If you want to produce quality bending at the lowest possible cost, it will pay you to investigate Pedrick Production Benders.

Write for descriptive folder.

PEDRICK TOOL & MACHINE COMPANY

3640 N. LAWRENCE STREET, PHILADELPHIA 40, PA.

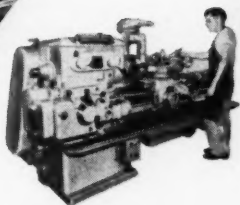
"300% Production Increase"

"Versatile Above All Others"

... reports LELAND ELECTRIC CANADA, LTD.
Motor Manufacturers
Guelph, Ontario, Canada



*It pays
to expand with
Lodge & Shipley
Lathes!*



Production-rated by users, Lodge & Shipley COPYMATIC lathes show significant production increases and savings on every application. If you require new lathes for expanded production, consider that one Copymatic will do the work of several conventional lathes.

For example, in the illustration, the diameters on a C-1138 steel motor shaft are being turned automatically by the COPYMATIC Lathe. Carbide tools are being used with .0085 feed at 300 S.F.P.M. RESULTS: "300%

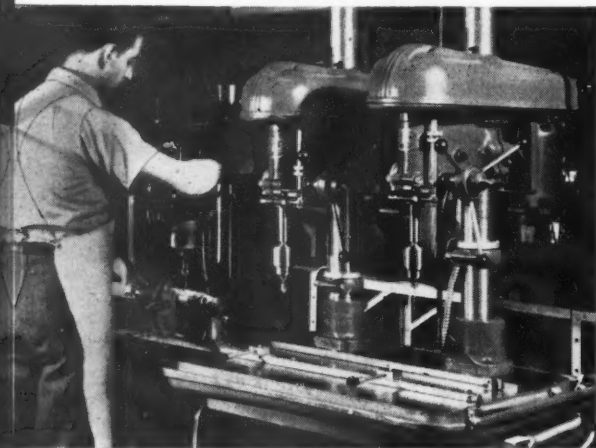
more production" than by former methods!

Let a Lodge & Shipley Representative show you how the COPYMATIC gives the versatility of the engine lathe and the productive capacity of automatic duplication (with instant changeover). Write today for Bulletin 675.

THE Lodge & Shipley
COMPANY

MACHINE TOOL DIVISION • 3057 COLERAIN
CHOREMASTER DIVISION • 800 EVANS ST.
CINCINNATI 25, OHIO

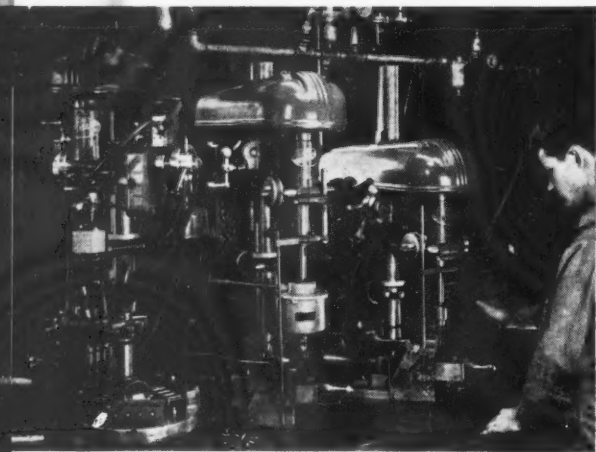
How Delta Tools Solved Four



**TIME SAVING 50%—
PRODUCTION INCREASE 100%**

**ALBERT SPECIALTY CO.,
CHICAGO, ILLINOIS**

When lack of a 3-spindle drilling machine jeopardized vital sub-contracts on aircraft and signal corps equipment, this company combined a Delta 2-spindle unit and a Delta 1-spindle unit for drilling, counter-sinking and tapping six holes in each end of a tube used in a signal corps tripod. A special fixture made it possible to drill the phenolic tubing and brass casting simultaneously with different position limits to make tripods interchangeable. Result—a 50 per cent time saving and production increased 100 per cent over the old method.



**DRILL AND TAP 160 PIECES
PER HOUR**

**EDWARD VALVES, INC.,
EAST CHICAGO, INDIANA**

To increase production speed and reduce labor costs on valve stop collars, Edward Valves, Inc., installed three specially tooled Delta drill presses. Piece is put in machine at right and drilled, manually positioned but automatically clamped by air on drill downstroke. Center machine does tapping operation. Production rate—160 pieces per hour on both operations. Left machine drills valve lubricant screws with 5/32 drill, 500 pieces per hour, with 95% of operation actual machining time, only 5% for loading.

There's a Delta Power Tool for Your Job—

WOOD OR METAL WORKING

53 MACHINES — 246 MODELS — MORE THAN 1300 ACCESSORIES

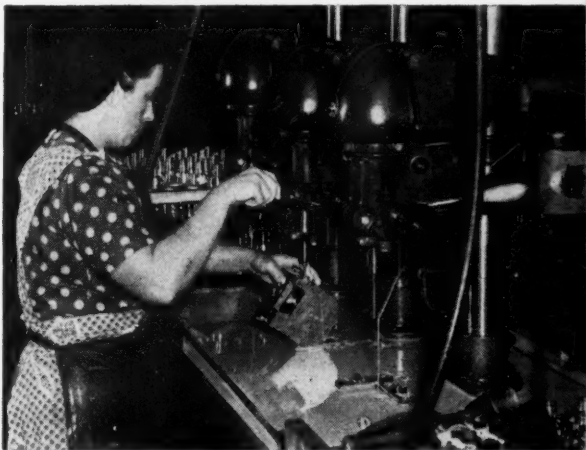
Your Delta dealer is listed in your Classified Phone Directory under "Tools"

Unusual Production Problems

ACCURATE HIGH SPEED DRILLING—NO SCRAP

OHIO BRASS CO.,
MANSFIELD, OHIO

To achieve precision accuracy at a cutting speed of 12000 rpm. in drilling and reaming forged aluminum blanks for fuse components, three Delta super high-speed drill presses were installed in sequence. Blanks are passed from one station to the next, and stops on the table make for quick, accurate positioning. Scrap has been eliminated.



DRILL PHENOLIC PARTS WITH PRECISION ACCURACY

ACRO MANUFACTURING CO.,
COLUMBUS, OHIO

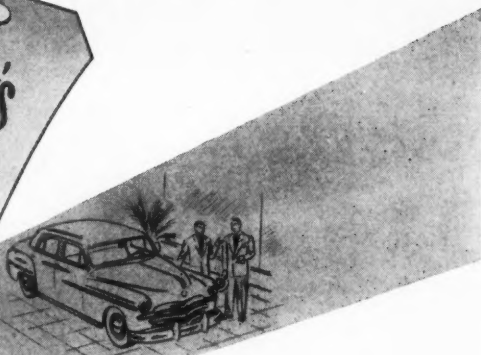
Delta Super-Hi speed drill presses solved three serious problems of drilling phenolic switch parts: (1) formerly drilled four switches to one bit—now drill 150; (2) enlarging holes close to edges of phenolic parts always resulted in 60% scrap because of breakage—with Delta scrap is only 10%; (3) drilling a .004 hole to tolerances of plus or minus .0005 formerly required two operations, drilling from either side. Now with Delta it is done from only one side.



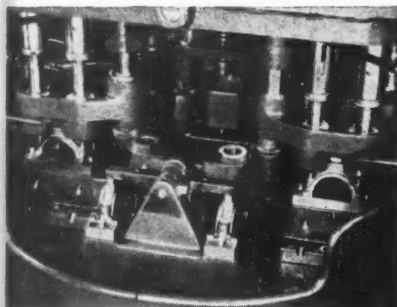
DELTA POWER TOOL DIVISION

Rockwell MANUFACTURING COMPANY

603H E. VIENNA AVENUE • MILWAUKEE 1, WISCONSIN



**The Buyer Gets a Better Value
...with an assist by
MORRIS ENGINEERED PRODUCTION**



Hand-clamped in pairs, forged steel (SAE 1041) connecting rod caps are rough spot faced, finished spot faced and countersunk (a total of twelve operations on the two parts) at a rate of one part every 8 seconds!



Automotive Connecting Rod Cap—Two Views.



THE **MORRIS**
MACHINE TOOL COMPANY

934 Harriet Street • Cincinnati 3, Ohio

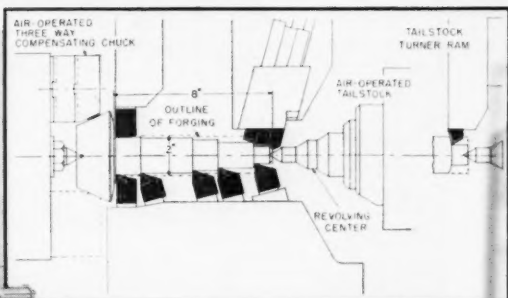
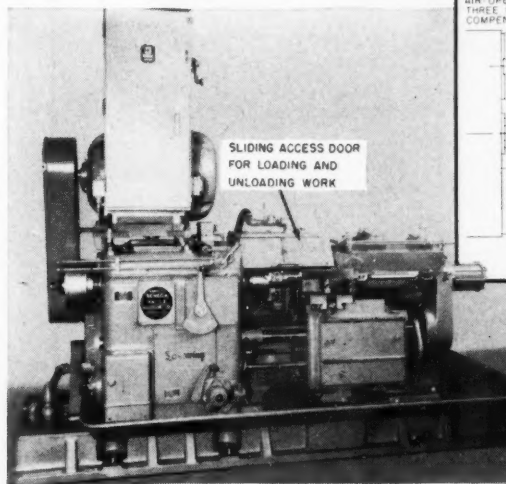
In the auto plant or in the showroom . . . it's an American trait to want quality at a price. The manufacturer gets it in a MORRIS Engineered Production Machine . . . for a better product at less cost . . . and passes it on to the buyer in a mass produced car.

MORRIS Production Machines cut time and costs wherever multiple drilling, reaming, tapping, boring or similar operations are performed. In addition, a major plus feature is offered, namely, all machines are built from standard units to do a special job . . . a real savings in initial costs.

**"A better product at less
cost with MORRIS
ENGINEERED PRODUCTION."**

MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE So-swing PEOPLE" SENECA FALLS, NEW YORK

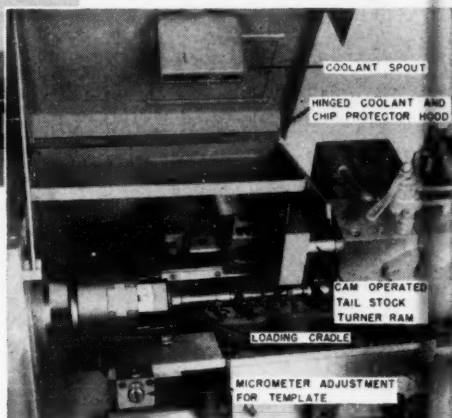


MODEL "AR" AUTOMATIC So-swing LATHE TURNS REAR AXLE PINION AT FAST PACE

Problem: Turn and face all stem diameters of Axle Pinion simultaneously, taking two cuts over the threaded diameter to remove large amount of surplus material.

Solution: The Model AR So-swing Lathe selected for this job was equipped with a cam-operated auxiliary turning ram mounted on the tail-stock casting and fitted with a carbide tool for removing surplus material ahead of a front carriage turning tool which does the sizing. The broken line on the drawing shows the actual shape of the forging and the large amount of surplus material at the threaded end. This drawing also shows the disposition of the tooling for turning and facing all diameters. All tools are tungsten carbide cutting at high surface speeds.

The machines supplied for this job were equipped with heavy chip guards to protect the operator from flying chips and coolant. Upper illustration shows the front sliding door thru which work is loaded and unloaded. Lower illustration shows the entire hinged hood in an



upright position to facilitate tool changes and adjustments. Note that the coolant spout is attached to and moves with the hood. This view also shows the cam operated tailstock turner ram and the loading cradle for the parts.


In operation, the operator simply opens the sliding door, places a rough forging in the loading cradle and closes the door. The air operated tailstock center pushes the part into position on the headstock center, the chuck jaws clamp the piece and the machine is then started. A safety device prevents starting of the machine spindle before the chuck jaws are closed, thereby preventing damage to the cutting tools and other equipment.

Seneca Falls engineering staff is at your disposal to help solve your turning problems.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

PRODUCTION COSTS ARE LOWER WITH So-swing



At CIRCLE 
*Quality
 Makes Progress*

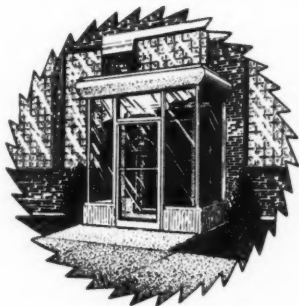
Over the years Circle® Metal Cutting Tools have established a quality reputation unexcelled anywhere! Circle® is expanding its plant for the sole purpose of

ensuring the maintenance of these high quality standards . . . a decision which will give you still higher quality and the most efficient and economical circular cutting tools available.

CIRCULAR TOOL CO., INC.

PROVIDENCE 5, RHODE ISLAND

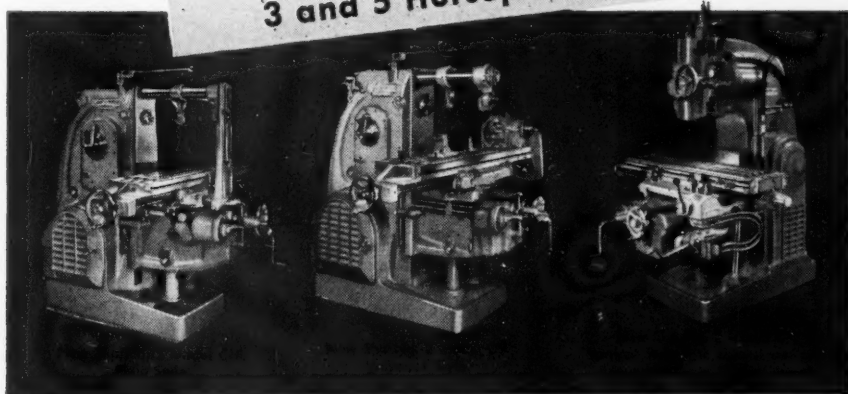
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KEARNEY & TRECKER ANNOUNCES . . .

Three new Knee-type Machines

3 and 5 Horsepower



New Kearney & Trecker No. 1 CH, No. 2 CHL and No. 2 CH Milling Machines have every performance-proven operating and construction feature needed for modern short-run or production milling requirements.

Machine	Working Surface	TABLE		Feeds Number & Range	Power Rapid Traverse — " Per Min.	SPINDLE	
		Power Feed	Travel			Not'l Std. Taper	Speeds — Number and Range
No. 1 Model CH Plain, Universal and (swivel head) Vertical	40" x 10½"	Long. 22"	22"	16—½" to 32"	150"	40	16 — 25 to 1500 RPM
		Cross 8"	10"				
		Vert. 17"	16"	16—¼" to 16"	75"		
No. 2 Model CHL Plain, Universal and (swivel head) Vertical	46" x 10½"	Long. 28"	28"	16—½" to 32"	150"	40	16 — 25 to 1500 RPM
		Cross 10"	10"				
		Vert. 17"	16"	16—¼" to 16"	75"		
No. 2 Model CH Plain, Universal and (sliding head) Vertical	50" x 12"	Long. 28"	28"	16—¼" to 32"	150"—plain & vert.	50	16 — 25 to 1500 RPM
		Cross 10"	12"		100"—universal		
		Vert. 18"	15"	16—¼" to 16"	75"—plain & vert. 50"—universal		

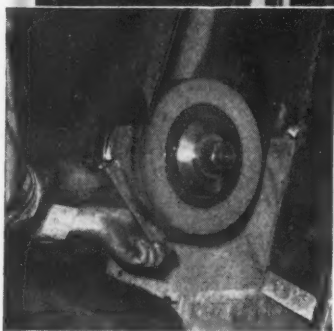
*Add 4" vertical travel for sliding head

These specifications point up the new larger working ranges of these new machines. You'll find they provide you with new major cost-cutting possibilities for toolroom and production work. Feeds and speeds listed are standard ranges. Optional ranges available.

If you're looking forward to modernizing your tool-room or milling machine line — you can't afford to overlook these new 3 and 5hp knee types. They offer you more practical operating features and heavier construction than any comparable equipment. They're designed to answer today's milling needs — and tomorrow's as well. For complete data on these machines, contact your nearest Kearney & Trecker representative or write direct. Kearney & Trecker Corp., 6784 West National Avenue, Milwaukee 14, Wisconsin.



ANOTHER INGENIOUS IDEA IN BELT BACKSTANDS



Close-up of finishing on a door-plate, initial and final operations entail simply a quick move from one belt to the other.

Photographs by
Coale Pictures,
Berlin, Conn.

The profit-saving advantages of finishing with BEHR-MANNING abrasive belts, are doubly realized in this backstand arrangement at P. & F. Corbin, Division of The American Hardware Corp., New Britain, Conn., prominent manufacturers of building hardware. Here are the big points:

1. **A TWO-MOTORED LATHE**, so the operators work independently, and stoppage of one does not stop the other —
2. **TWO CONTACT WHEELS** and belts (rough and finish) at each end of the lathe. Belts are only a few inches apart, making the roughing and finishing almost a single operation on each piece —
3. **BACKSTANDS ARE RAISED ABOVE**, instead of extending back of contact wheels. The supporting structure is mounted on the lathe itself. Valuable floor space is saved.

This ideal arrangement was devised by Mr. Max Grapski, the company engineer, with the cooperation of a BEHR-MANNING Engineer.

ARE YOU HANDLING your finishing operations the most profitable way? Why not utilize the experience of BEHR-MANNING Engineering Service. No obligation. Write to Dept. MS-8.



BEHR-MANNING • TROY, N. Y.

COATED ABRASIVES • SHARPENING STONES
PRESSURE-SENSITIVE TAPES

EXPORT: BEHR-MANNING OVERSEAS INC., NEW ROCHELLE, N. Y., U. S. A.

How to expand your plant's production without extra construction or manpower!

WARNER & SWASEY's new CAMLESS 5-Spindle Automatics have expanded greatly the productive capacity of Alloy Steel Products Company. Previously, production of their stainless steel valves for the chemical and oil industries, limited to short runs, had been done profitably on hand machines.

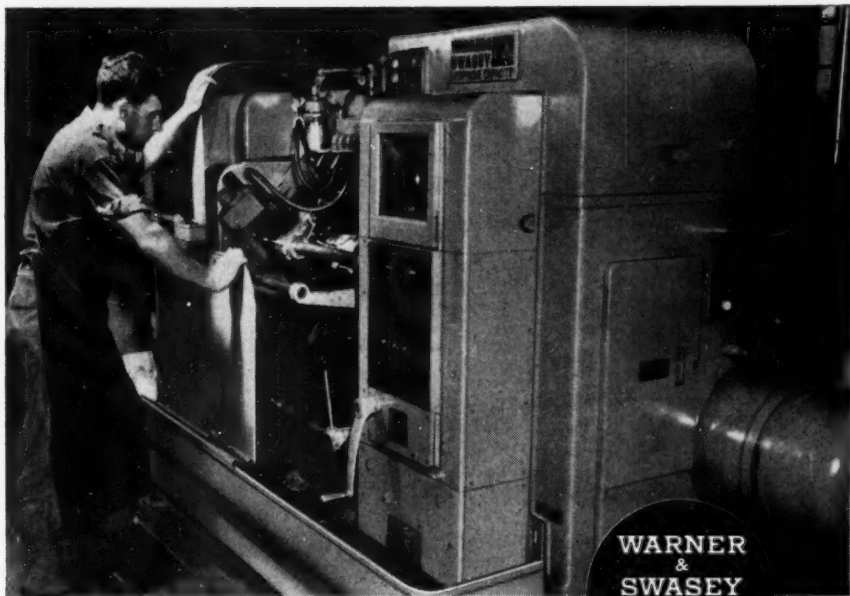
But increased production required building space for more machines as well as hiring more operators. Their only other choice was to consider new production methods.

Alloy Steel made their choice—Warner & Swasey Camless 5-Spindle Automatics.

Ideally suited for short and medium runs, these new automatic machines now handle profitably 69 different jobs in lots from 200 to 500. Volume—better in quality and finish—has stepped-up 50% in allover average. No investment in cams is needed!

And—particularly important in today's tight manpower market—more work can be done with fewer operators.

If you are faced with production schedules that apparently require additional construction and manpower, call in your nearest Warner & Swasey Field Representative. He'll be glad to show you just how a Warner & Swasey Automatic can help.

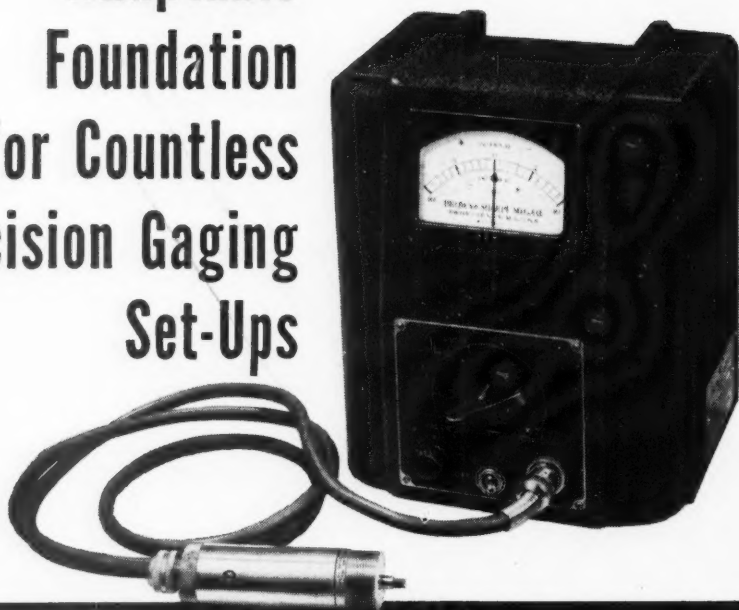


Warner & Swasey CAMLESS 5-Spindle Automatic at
ALLOY STEEL PRODUCTS CO., Linden, New Jersey.

**WARNER
&
SWASEY**
Cleveland
Machine Tools
Textile
Machinery

YOU CAN MACHINE IT BETTER, FASTER, FOR LESS WITH WARNER & SWASEY TURRET LATHES, AUTOMATICS AND TAPPING MACHINES

Adaptable Foundation for Countless Precision Gaging Set-Ups



Brown & Sharpe Gage Head Cartridge and Electronic Amplifier

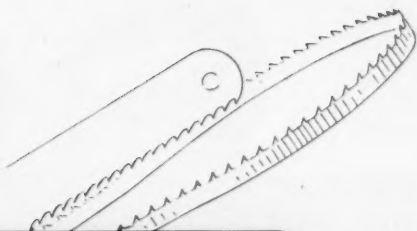
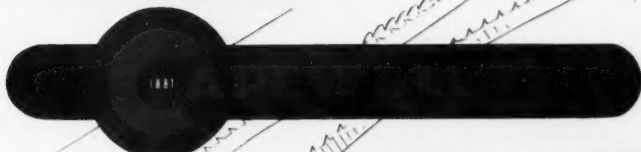
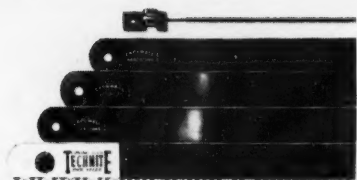
Here's a really economical basis for versatile precision gaging equipment.

The Brown & Sharpe Gage Head Cartridge and Electronic Amplifier provide accurate gaging, with direct-reading indications, in units of .0001" to .00001". Simple jigs or fixtures to hold the cartridge often can be made in your own plant. By shifting the same cartridge among a number of fixtures, you can do precision gaging of practically any length, diameter, or other dimension. Write for complete details. Brown & Sharpe Mfg. Co., Providence 1, R.I., U.S.A.

WE URGE BUYING THROUGH THE DISTRIBUTOR



Brown & Sharpe



BUYERS' GUIDES *for* HACK SAW

and BAND SAW BLADES

With the new buyers' guide bulletins now available to you, selection of the right blades for your work is made much easier. Make sure that these new bulletins are available in your purchasing department. Use the coupon below.

POWER HACK SAW BLADES: TECHNITE special alloy high speed steel; SAFETECH, a high speed blade with softer backing for safety, shatterproof. **HAND HACK SAW BLADES:** TECHNITE, FLEXTUNG, FLEXLOY and HARD-TUNG — four types to cover every hand blade requirement, each available in two lengths, four different tooth counts.

DAFILES: The all-purpose saw cuts in *any* direction . . . ideal for scroll or pattern work. Dafilés can be used in

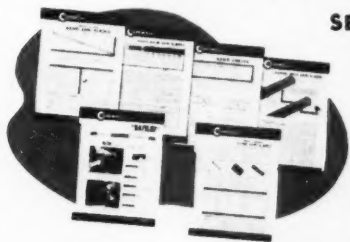
standard hack saw frames or in a power cutting jig.

BAND SAW BLADES FOR METAL CUTTING: Capewell Flexible Back Hard Tooth Band Saw Blades (available in contour saws, cut-off saws, and skip tooth saws) and Capewell Spring Temper Band Saw Blades.

FOR WOOD CUTTING: Capewell Narrow and Wide Wood Cutting Band Saw Blades.

FOR CUTTING FIBROUS MATERIALS: Capewell Band Knives, straight edge, scalloped and wavy edge types.

FOR CUTTING MEAT: Capewell Band Saw Blades and Blades for Hand Meat Saw Frames.



SEND FOR THESE NEW BULLETINS TODAY!



THE CAPEWELL MANUFACTURING CO.
67 Governor Street, Hartford, Connecticut

Gentlemen: Please send me bulletins on
☐ Hacksaw Blades; ☐ Dafilés; ☐ Band Saw Blades; ☐ Band Knives

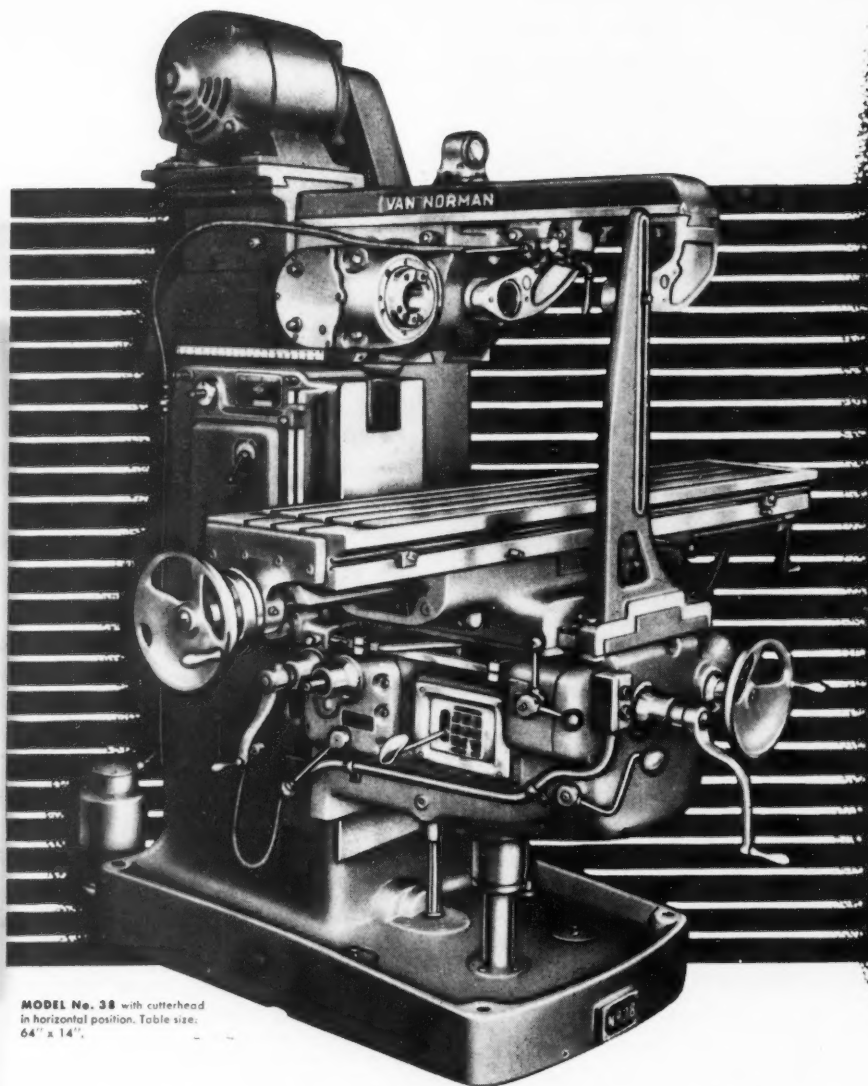
NAME

COMPANY

ADDRESS

BUY THROUGH YOUR DISTRIBUTOR

TICABT



MODEL No. 38 with cutterhead
in horizontal position. Table size:
64" x 14".

There's a Van Norman Ram Type Miller for Every Application

You'll Get More Production Hours with the **VAN NORMAN** **No. 38 Ram Type Miller**

Operating records in many plants prove that the Van Norman No. 38 Ram Type Miller increases milling production, cuts down idle machine time, and lowers over-all milling costs.

The adjustable cutterhead permits you to perform horizontal, angular or vertical milling on *one* machine. There is no waiting for single purpose machines because practically all operations can be on

the ram type miller. All the operator need do is position the cutterhead in the desired position and he is ready to start milling. In addition, work set-ups are reduced to a minimum and the operator gets out more work.

Investigate the Van Norman No. 38 Ram Type Miller for the toolroom, laboratory, pattern and die work, or production milling. Write for complete information.

Compare These Operating Features

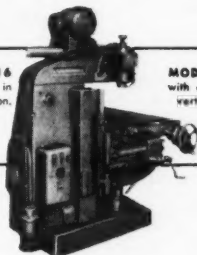
- **WIDE RANGE OF USE**... Adjustable cutterhead has 90° adjustment.
- **SIMPLICITY OF CONTROL**... All power feed controls are directional — operate in direction of desired table, saddle and knee movement.
- **INCREASED RANGE**... Ram adjustment, in and out over column, provides added work range and capacity.
- **RIGIDITY AND POWER**... Heavy-duty, hardened alloy steel gears with multi-splined shafts; massive streamlined cutterhead and ram; rugged column and knee assembly.
- **LONG LIFE**... Automatic lubrication; anti-friction bearings; larger diameter feed screws.
- **SPEED**... Spindle speeds up to 2000 R.P.M., powered by a 10 h.p. motor, permits every type of milling with all types of cutting tools.

VAN NORMAN COMPANY

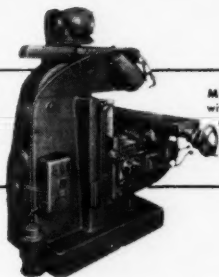
SPRINGFIELD 7, MASSACHUSETTS



MODEL No. 16
with cutterhead in
horizontal position.
Table size:
37" x 9½"



MODEL No. 231
with cutterhead in
vertical position.
Table size:
45" x 10"



MODEL No. 26
with cutterhead in
angular position.
Table size:
58" x 13"



FEEDING STEEL SHEETS into flat-polishing and coating equipment for pre-finishing before stamping.

3M Abrasives polish flat sheets prior to forming and plating!

"Pre-polishing" steel sheets in machines equipped with 3M Abrasive Belts boosts production. Flat stock passes under a series of grinding and polishing heads, at speeds up to 40 feet per minute.

Pits, seams, slivers and other surface imperfections are removed while the steel is in the sheet, coil

or blank form. Tough aluminum oxide coatings of the abrasive belts finish the stock to smooth perfection. After forming, parts are then ready for plating or painting. Tedious hand polishing is eliminated.

3M Methods and 3M Abrasive Belts can cut *your* finishing costs. Send coupon for full information.

Minnesota Mining & Mfg. Co. Dept. MMS 851
St. Paul 6, Minn.

- ☐ Please send me latest report on "pre-polishing."
☐ Please have a 3M Methods Engineer call.

Name.....

Firm.....

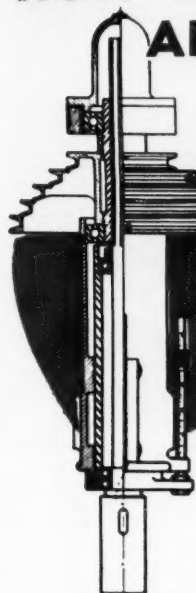
Address.....

City.....Zone...State.....



Made in U.S.A. by MINNESOTA MINING & MFG. CO., St. Paul 6, Minn., also makers of "Scotch" Brand Pressure-sensitive Tapes, "Scotch" Sound Recording Tape, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-Slip Surfacing, "3M" Adhesives. General Export: Durex Abrasives Corp., New Rochelle, N. Y. In Canada: Minnesota Mining & Mfg. Co. of Canada, Ltd., London, Canada.

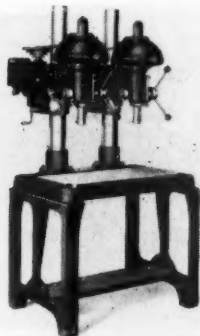
HOW TO JUDGE THE ACCURACY AND LONG LIFE OF A DRILL



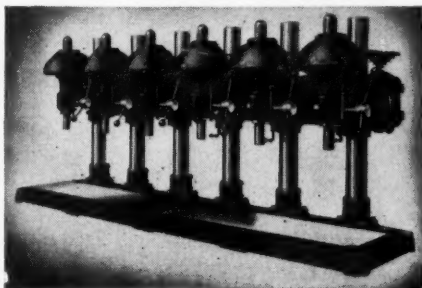
Spindle Assembly
of a Buffalo
No. 18 Drill

**LOOK AT ITS
SPINDLE CONSTRUCTION**

Take this spindle of the "Buffalo" No. 18 Production Drill. It's 15/16" diameter tough alloy steel—has all the necessary properties of high tensile strength, toughness and ability to resist wear. This spindle runs in precision type ball bearings. The double row lower bearing is capable of taking the full thrust of a 1" drill with capacity to spare. Both spindle and spindle sleeve bearings are adjustable. All working parts are of high grade steel. The results? Smooth, permanently accurate performance in this vital part of your drill. And, of course, "Buffalo" has not neglected the other parts of the No. 18 Drill. The big, accurately finished working table, the sturdy 4" column, the handy 3-spoke feed handle and many other features add up to efficient drilling in these 1" capacity machines. Write for BULLETIN 3123C FOR ALL DETAILS.



Left, No. 18-P 2-spindle bench type drill.



Right, No. 18-S 6-spindle drill, one of 12 models to choose from.

BUFFALO "Buffalo" FORGE COMPANY
388 Broadway Buffalo, New York
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

DRILLING

PUNCHING

CUTTING

SHEARING

BENDING

Cut...

LARGE HOLES

... thru any machineable material up to 1 1/8 INCHES thick!



Here is a premium tool which makes it possible to saw holes in one short operation ... large holes which heretofore had to be laboriously machined "a-chip-at-a-time."

MARVEL High-Speed-Edge Hole Saws have strength to withstand the terrific peripheral strains of heavy duty operation in lathes, drill presses or portable power tools. They have a high speed steel cutting edge which is electrically welded to a tough, alloy steel body, high speed steel pilot drills, heavy hexagonal shanked arbors and sufficient set for deep drilling. They are self-aligning, as the larger diameter saws float on their arbors and are driven by double drive pins. They will saw round holes accurately in any machineable material.

MARVEL High Speed-Edge Hole Saws come in 35 sizes, from 3/8" to 4 1/2". They are carried in stock by leading industrial distributors

WRITE FOR BULLETIN 51-49

"MARVEL" has *Always* had the edge!

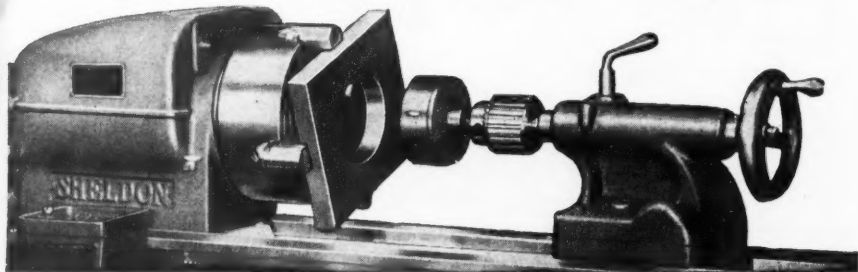


ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 Bloomingdale Avenue

Chicago 39, U. S. A.



KEEP Tools Sharp Production Up With OLIVER ACE Universal Tool and Cutter Grinders

Production problems are many—but no problem exists in keeping difficult cutters sharp when your toolroom is equipped with OLIVER ACE Universal Tool and Cutter Grinders. Cutters of all types are ground easily on the OLIVER ACE. Excelling on high speed and Tungsten-Carbide work, OLIVER Grinders give guaranteed accuracy—they're designed and built for it. OLIVER ACES are proven and dependable.

No computation is required for the ACE to handle a wide range of cutter grinding. Its direct reading for clearance eases the job for the operator (no stoop . . . no squat . . . no squint). Operation is easy—setup is simple. The ACE is faster on most grinding operations.

Priced to meet your budget, the ACE excels for grinding face mills up to 15" • slab mills • slitting saws • dovetail cutters • angular cutters • double angle cutters • Fellows helical cutters • reamers • taper reamers • production gash-ing.



**BE WISE—
OLIVERIZE**

**2 MODELS: Standard and
Heavy Duty (illustrated).**

Write For Illustrated ACE Catalog



OLIVER INSTRUMENT CO.

1430 E. MAUMEE • ADRIAN, MICHIGAN

**AUTOMATIC DRILL GRINDERS
TOOL & CUTTER GRINDERS—DRILL
POINT THINNERS—TEMPLATE
TOOL GRINDERS—FACE MILL
GRINDERS—DIE-MARKING MACHINES**

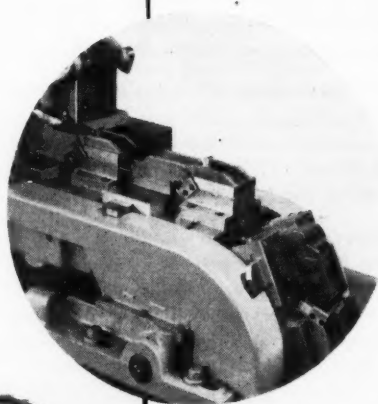


Continuous

surface broaching of small parts

● In many plants where large quantities of duplicate metal parts are being machined substantial savings are being made through the adoption of surface broaching. Production is exceptionally high, close tolerances are maintained, and tool maintenance costs are much lower than with ordinary methods. Foote-Burt engineers, pioneers in this advanced machining method, have had a wide experience in applying surface broaching in many fields.

THE FOOTE-BURTE CO. • Cleveland 8, Ohio
Detroit Office: General Motors Building



● Holding fixtures are designed for quick, convenient loading, with automatic clamping and unclamping.

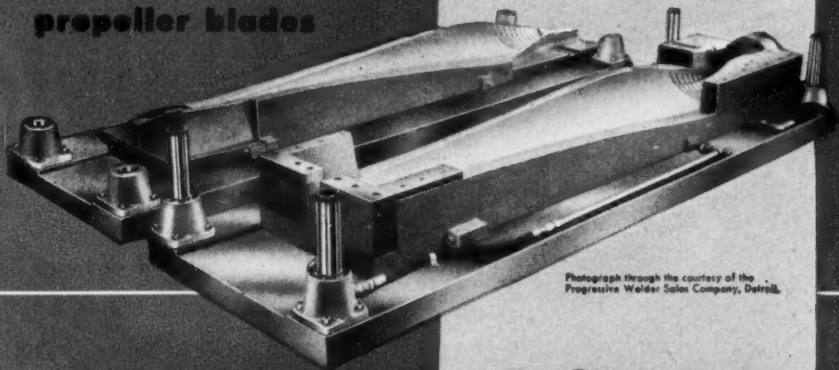


FOOTBURT machine tools

... a time tested line of machine tools

HOT FORMING

aircraft
propeller blades



Photograph through the courtesy of the
Progressive Welder Sales Company, Detroit.

DANLY DIE SETS

CALL ON YOUR
NEAREST DANLY BRANCH
for fast, local delivery!

*CHICAGO 30, 2100 South Laramie Avenue

*CLEVELAND 14, 1850 East 33rd Street

*DAYTON 7, 3196 Delphi Avenue

*DETROIT 16, 1549 Temple Avenue

*GRAND RAPIDS 113, Michigan Street N.W.

*MINNEAPOLIS 4, 5 West 10th Street

*LONG ISLAND CITY 1, 47-28 37th Street

*LOS ANGELES 54, Ducommun Metals & Supply Co.,
4890 South Alameda

*MILWAUKEE 2, 111 East Wisconsin Avenue

*PHILADELPHIA 44, 18 West Chelton Avenue

*ROCHESTER 4, 16 Commercial St.

*Indicates complete stock

Reliable Danly precision plus unmatched facilities for the production of standard or special die sets like the one shown here make Danly Die Sets the first choice of diemakers everywhere. A nation-wide system of branch assembly plants* assures prompt, time saving service.

DANLY MACHINE SPECIALTIES, INC.

2100 South Laramie Avenue, Chicago 30, Illinois



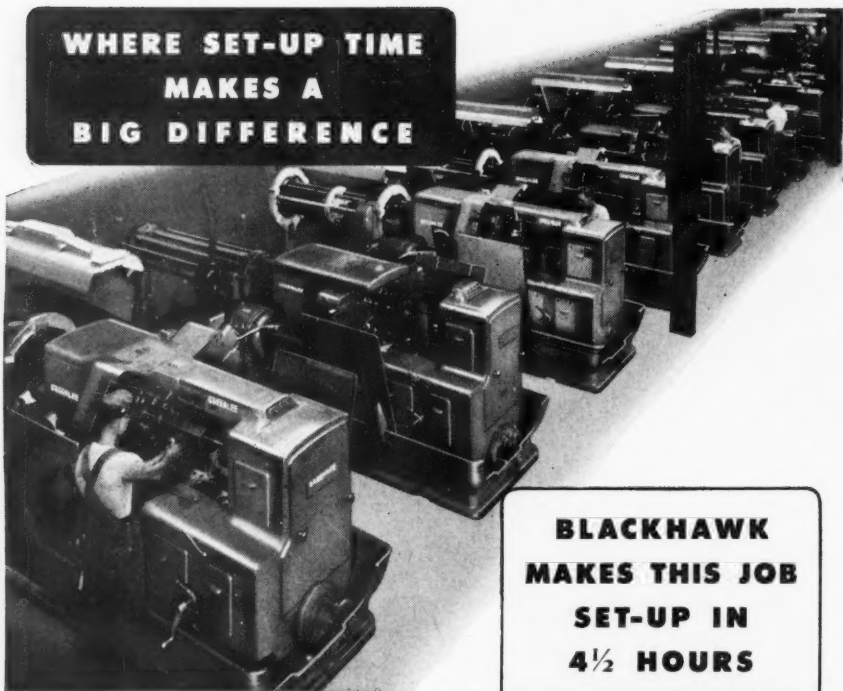
PRECISION DIE SETS

STANDARD AND SPECIAL



MORE THAN 35 YEARS OF DEPENDABLE SERVICE TO THE STAMPING INDUSTRY

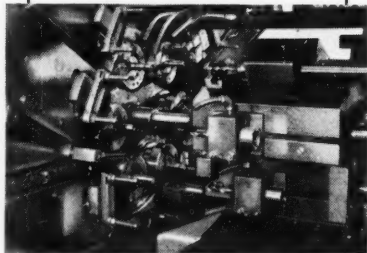
**WHERE SET-UP TIME
MAKES A
BIG DIFFERENCE**



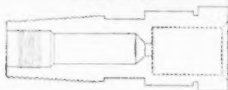
**BLACKHAWK
MAKES THIS JOB
SET-UP IN
4½ HOURS**

To be profitably accomplished, small-lot production on multiple-spindle screw machines requires a minimum of set-up time. Greenlee Automatics were especially designed for rapid machine changes to accommodate small-lot work.

The Blackhawk Mfg. Co., of Milwaukee, manufacturers of hydraulic jacks, bending equipment, tools, and fittings, find Greenlee Automatics well-suited for their critical production requirements. They like the Greenlee's easily-changed forming slide cams, rapid stroke-setting arrangement, and interchangeable tooling facilities, finding these and other features ideal for making profitable runs of 10,000 or more pieces. Properly-tooled Greenlee Automatics can solve your production problems, whether your job runs are large or small. Why not submit part prints for cost-saving recommendations?



SET-UP FOR "SPEED-D" COUPLER PART
* U. S. Pat. Off.



Twelve operations on this steel piece are performed in a cycle time of 21 seconds. Included are forming and shaving to close tolerances, facing, turning, and undercutting, accurate deep drilling, threading, and tapping. Set-up time is 4-1/2 hours. Only one tool change is needed on a 10,000 run.



**GREENLEE BROS.
& COMPANY**
1888 MASON AVENUE
ROCKFORD, ILLINOIS

MULTIPLE-SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC SCREW MACHINES • AUTOMATIC TRANSFER PROCESSING MACHINES

**GROUND
AND
LAPPED
FOR LONGER WEAR
TAFT-PEIRCE CYLINDRICAL
PLUG AND RING GAGES**

T-P Chromium Plated Cylindrical Ring Gages are available in sizes from .240" to 12"

T-P Ring Gages with Norbide* insert are available in sizes from .240" up

T-P Cylindrical Plug Gage of hardened alloy steel

T-P Cylindrical Plug Gage with tungsten carbide gaging surface

T-P Cylindrical Plug Gage, chromium plated

T-P Emmerton Ball Bearing Plug Gage

T-P Cylindrical Plug Gage with gaging surface of Norbide*

T-P Reversible Plug Gage with adjustable length, positive lock

T-P External Ring Gage with insert gaging surface of tungsten carbide

T-P Style 9324 AGD Plug-type External Ring Gage of hardened alloy steel

*Norbide (Boron Carbide). Trademark of Norton Co., Reg. U. S. Pat. Off.

You'll find that more pieces can be gaged per gage dollar when you standardize on Taft-Peirce Cylindrical Plug and Ring Gages. Not only are they made of the finest materials, heat-treated for maximum hardness, but they are ground and lapped to gagemakers' limits of accuracy by a special process which produces a super-smooth surface, assuring long wear-life and dependable precision.

The exceptionally complete Taft-Peirce Gage line includes Emmerton Ball Bearing Plug Gages, special gages to your specifications, and of course all American Gage Design standards. Available in alloy steel, Norbide,* Tungsten Carbide and Chromium plated. Write to:



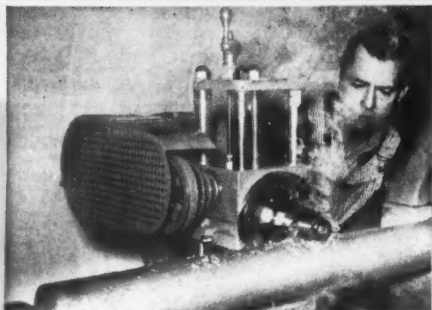
THE TAFT-PEIRCE MFG. CO.
WOONSOCKET, RHODE ISLAND
T-P MEANS TOP PRECISION

NEW

MODELS—FEATURES

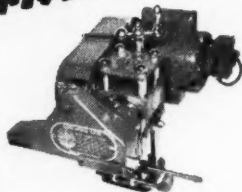
MASTER MILLING ATTACHMENTS

FOR PRODUCTION—TOOL ROOM—EXPERIMENTAL AND MAINTENANCE SHOPS

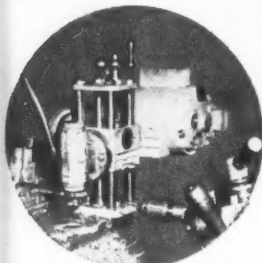


MILLING ON LATHE—Model "M" 1½ h. p. milling ½" keyway one foot per minute.

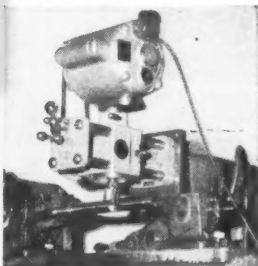
LATHES TURRETS AND MILLING MACHINES



Master Universal
Slotting and Keyseating Head



MILLING ON TURRET—Model "B" with 90° milling head mounted on rear cross-slide for keyways, slots, cross milling—completing part in turret.



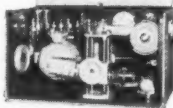
ON MILL—One or two milling heads can be used on post assembly for single or multiple milling cuts. Mounts on overarm for vertical milling or cross-ways for opposed milling head.

3 SIZES • CAPACITIES

- Model "C"—½ h. p. motor—9" to 13" swing lathes
- Model "B"—½ or ¾ h. p. motor—14" to 18" swing lathes
- Model "M"—1 or 1½ h. p. motor—18" to 72" swing lathes

The Master Lathe Converter is a precision multi-purpose machine tool attachment adaptable on most all basic shop machines. The basic unit does milling, drilling, boring, and has eight interchangeable heads for milling, drilling, grinding, slotting, keyseating, and indexing. Spindle speeds, 50 to 15,000 rpm. It provides complete machining facilities with minimum equipment investment, produces more operations per set-up thus increasing production of your present equipment, saves work transfer, assures accuracy, is simple and fast to set up. Prime and subcontractors are converting their present equipment for special applications and production with the multi-purpose Master Lathe Converter.

COMPLETE SHOP KIT—This group of equipment includes basic milling unit, external and internal grinding heads, 90° universal and hi-speed milling heads, slotting or internal keyseating head, 40 to 1 geared dividing head, seven arbors, in a heavy plywood shop cabinet. This kit provides facilities for most all machine shop operations on a lathe at a fraction of the investment required for individual machines, plus wide use on other basic shop machines. Ideal for maintenance and repair, tool room, experimental, mobile units, aboard ships, and production shops.



- ★ MILLING ★ DRILLING ★ BORING
- ★ THREAD MILLING ★ GRINDING
- ★ SLOTTING ★ INDEXING
- ★ INTERNAL KEYSEATING

WRITE FOR FREE LITERATURE

MASTER MANUFACTURING CO.
1302 EAST AVENUE A
HUTCHINSON, KANSAS U. S. A.

Belt
Sanders

Bench
Grinders

Drills

Drill
Stands

Fender
Hammers

Grinders

Electric
Hammers

Impact
Wrenches

Nibbler

Not
Setters

Polishers

Sanders

Saws

Screw
Drivers

Tappers

Valve
Refacers

Valve
Reseaters

Air Tool
Kits

"PACKY"



Thor
ELECTRIC

IMPACT WRENCH

HITS HARDER — WORKS FASTER

Here's power that cannot be stalled . . . no matter what the job—and this great new Thor Silver Line Impact Wrench performs scores of different jobs—nut running, stud removing, drilling, tapping, etc. Light weight—no torque reaction—easy to handle. Call your Thor jobber for a free demonstration.

Independent Pneumatic Tool Co.,
Aurora, Ill.

No tool
buyer's file
is complete
without
Catalog E-2.



Thor

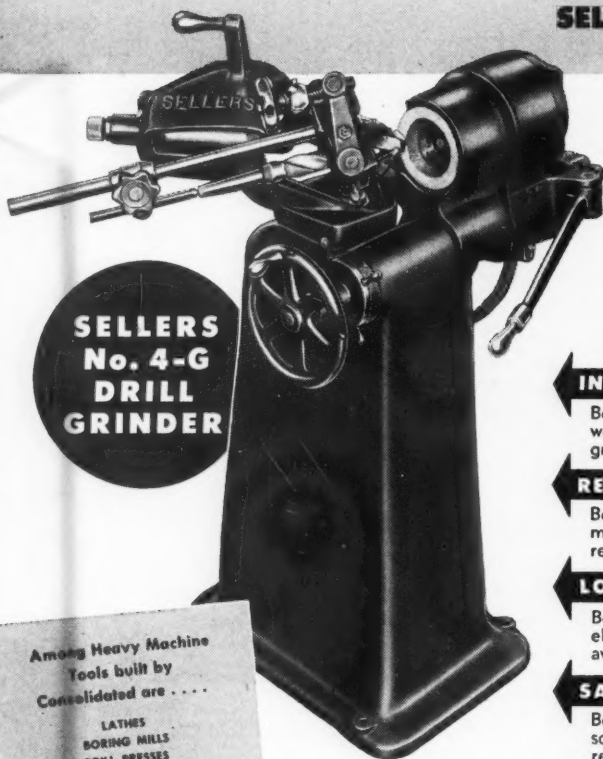
TOOLS

ASK FOR THE *Silver Line*

Want better drill performance?

Then try grinding your drills on the grinders
used and recommended by leading
drill manufacturers.....

SELLERS DRILL GRINDERS



**SELLERS
No. 4-G
DRILL
GRINDER**

Among Heavy Machine
Tools built by
Consolidated are.....

LATHES
BORING MILLS
DRILL PRESSES
MILLING MACHINES
COLD SAW MACHINES
BORING, DRILLING AND
MILLING MACHINES
DRILL AND TOOL
GRINDERS
PLANERS
SLOTTERS
RAILROAD SHOP TOOLS
AUTOMOTIVE TOOLS
AND OTHER
SPECIAL MACHINES

INCREASE PRODUCTION

Because Sellers correctly ground drills can be safely run at maximum speeds, they increase machine output.

LENGTHEN DRILL LIFE

Because with Sellers grinding, angles and clearances are correct, drill lips cut equally and efficiently, wear is minimized, less stock is removed when grinding, doubling drill life.

INCREASE HOLES PER GRIND

Because Sellers correct grinding reduces wear, drills remain sharp longer, require less grinding.

REDUCE OVERHEAD AND LABOR

Because Sellers precision grinding increases machine production, drilling costs are reduced.

LOWER ASSEMBLY COSTS

Because under- and over-size holes can be eliminated, reaming or bushing correction is avoidable, saving time and labor.

SALVAGE DAMAGED DRILLS

Because burned and broken drills ordinarily scrapped can be satisfactorily reclaimed and returned to profitable service.

A self-contained dry grinder, the Sellers No. 4-G has a proved record of top efficiency for grinding right hand and flat twist drills, 2, 3 and 4 lip up to 2" diameter. It has an actual maximum capacity for 2 and 4 lip drills up to 3" diameter and 3 lip up to 2 7/16" diameter. Lips are ground to equal length, angle and clearance. Clearance as produced by the Sellers Method, automatically determined by the machine for different size drills, is sufficient to insure free cutting without weakening the cutting edges. Part replacement is negligible but, if ever required, replacement parts are always available. Complete information will be furnished upon request.

BUILDERS OF HEAVY DUTY MACHINE TOOLS SINCE 1848

BETTS • BETTS-BRIDGEFORD • COLBURN • HILLES & JONES • MODERN • NEWTON • SELLERS

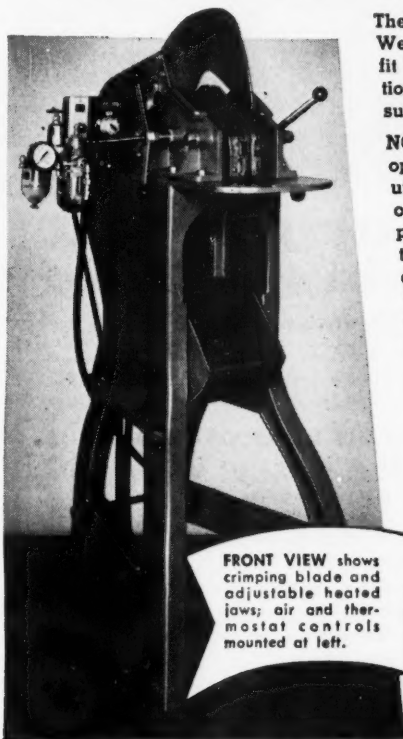


**CONSOLIDATED
MACHINE TOOL CORPORATION**

ROCHESTER 10, NEW YORK

Leather Crimping Machine

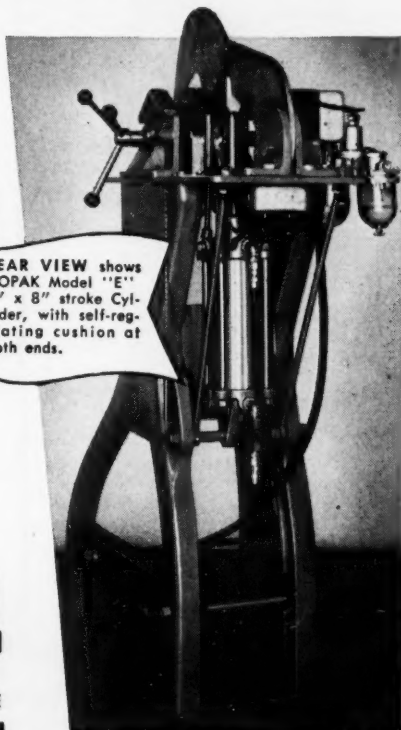
Air-Powered by NOPAK CYLINDER



FRONT VIEW shows crimping blade and adjustable heated jaws; air and thermostat controls mounted at left.

The crimping machine pictured was developed by Western Supplies Co. of St. Louis. It "makes shoes fit better" because it pre-forms leather upper sections, under heat and pressure, so that they can be subsequently drawn snugly against the lasts.

NOPAK Air Cylinder Power was chosen to reduce operator fatigue and increase production . . . to utilize controlled line pressure over the full range of crimping operations . . . to eliminate working parts . . . and because NOPAK mounting characteristics were best fitted to the machine. A study of the cylinder's construction indicated there was "practically nothing to wear out." It was also found to meet the high standards required at a comparatively low price.



REAR VIEW shows NOPAK Model "E" 4" x 8" stroke Cylinder, with self-regulating cushion at both ends.

GALLAND-HENNING MFG. CO.
2758 S. 31st St. • Milwaukee 46, Wis.

Representatives in Principal Cities.

Write for Bulletin SW-1 or refer to Sweet's File for Product Designers.

NOPAK
VALVES AND CYLINDERS
DESIGNED for AIR and HYDRAULIC SERVICE

STOP!

the high cost of piercing sheet metal in quantities of 1-5-10-50-100 or 200 pieces of a kind.

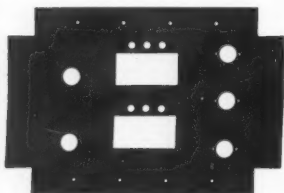
COMPARE!

the Wiedemann R-41P with your best times on jobs similar to those below on sheets up to 26" x 48".

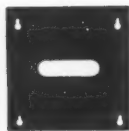
TIMES!

shown include set-up.

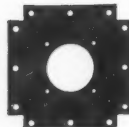
INVESTIGATE the WIEDEMANN METHOD



First piece 9.5 minutes
Additional pieces
2.75 minutes each
Includes all set up



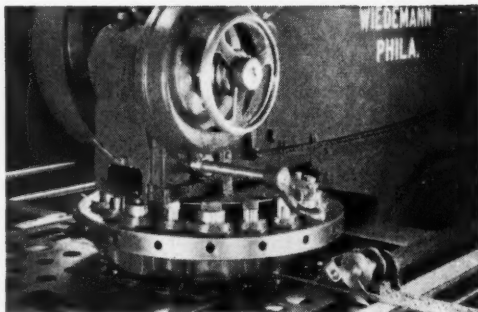
First piece 3.75 minutes
Additional pieces
.90 minutes each
Includes all set up



First piece 2.40 minutes
Additional pieces
1.05 minutes each
Includes all set up

Do You Produce Templates?

The Wiedemann R-43 Micro-Turret Punch Press produces templates with holes accurate to $\pm .002''$ at unparalleled high speed. Write for details.



R-41P Wiedemann Turret Punch Press

Here's how you can pierce short run work at such great savings

SAVE on Tool Set-up

- ★ 18 punches and dies set-up for instant use
- ★ Install tools in turrets in less than one minute
- ★ Tool cost is always low

SAVE with UNMATCHED FLEXIBILITY and SPEED in ACCURATELY LOCATING HOLES

- ★ Gauges are set-up from drawing dimensions, charts, or templates
- ★ Gauges locate from one corner of the material
- ★ Center punched layout or pilot holes
- ★ Back gauge bar is handwheel operated
- ★ Cross stops are positive
- ★ Both motions are provided with direct reading scales or dials

THE R-41P TURRET PRESS PIERCES . . .

- ★ Round holes to $3\frac{1}{4}''$ dia.; square holes to $2\frac{1}{4}'' \times 2\frac{1}{4}''$; round end slots to $3\frac{1}{4}''$ long.
- ★ Odd shaped and grouped holes
- ★ Knockouts, dimpling, corner and edge notches, radius corners, small louvers
- ★ Special corner development cutouts
- ★ Large rectangular, square, or L shaped openings

THE WIEDEMANN METHOD IS THE ONLY LOGICAL SOLUTION TO THE SHORT RUN PIERCING PROBLEM

Send Drawings for Time Study

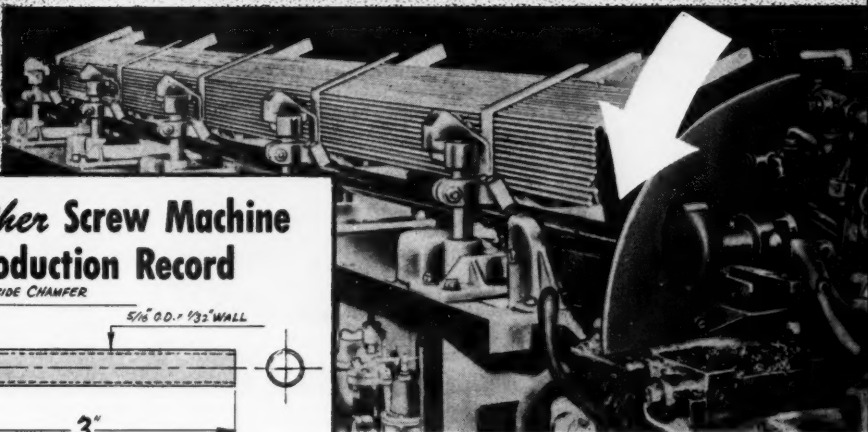
WIEDEMANN MACHINE COMPANY

4219 Wissahickon Avenue • Philadelphia 32, Pennsylvania

Increases Production 50.9%

with *Lipe Automatic*

MAGAZINE-LOADING BAR FEED



Another Screw Machine Production Record

1/32" x 95° INSIDE CHAMFER

5/16" O.D. x 1/32" WALL

3"

THE JOB—Small job shop with six B & S Screw Machines — two operators hand-loading all six. Part made from brass tubing $\frac{5}{16}$ " O.D. x $\frac{1}{32}$ " wall. Inside chamfer on one end; other end cut off square. Length 3". Old hand-loading method averaged 560 pieces per hour per machine.

THE RESULT—With the installation of the first Lipe Automatic Magazine-Loading Bar Feed on one machine, the production of this machine was stepped up to 845 pieces per hour — an increase of 50.9% — approximately 94% of actual gross machine capacity. Other Lipe Automatic Magazine-Loading Bar Feeds are now on order.

THE CONCLUSION—In general machine shops with small, closely supervised screw machine departments, as well as in large multiple-machine production layouts, this fully automatic unit can cut cycle time . . . get *bigger production* . . . on a wide variety of work. *Here's why:*

- Stock is fed to screw machine all the time — not dependent on operator.
- Pressure constantly behind stock.
- Eliminates feed fingers.
- Avoids multiple feed finger feedouts.
- Model AML gives maximum output of machine — no "cutting air."
- Saves in changeover set-up time.

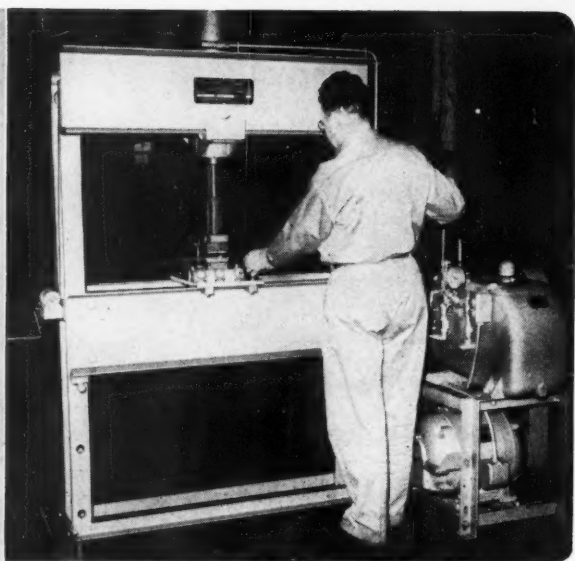
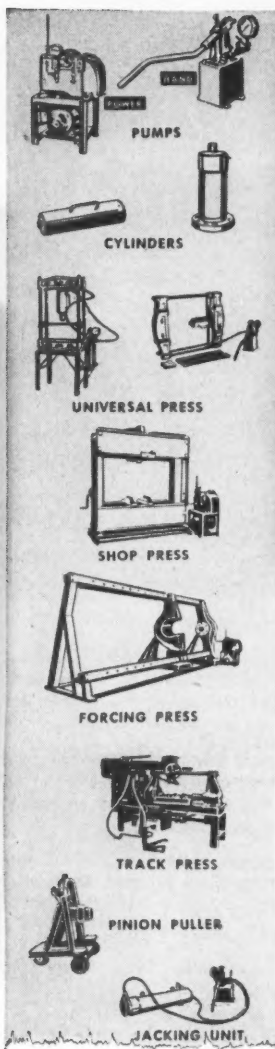
Get full details on how this machine will increase production and save you money. It's today's big advancement in screw machine stock feeding. Our engineers will gladly study your problem . . . no obligation.



Lipe - ROLLWAY CORPORATION

Manufacturers of Automotive Clutches and Machine Tools

Syracuse 1, N. Y.



Above is a standard Rodgers 60 ton Shop Press with a Rodgers Power Pump. Other models have capacities of 80, 100, 150, 200, 300 and 400 tons.

HERE'S *Rodgers Hydraulic* POWER ...to do 101 jobs faster, better, easier

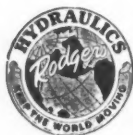
You'll find a Rodgers Shop Press is the finest all-around time-and-labor-saving equipment you can have in your plant... for a multitude of pressing, forming, bending, straightening jobs... for die tryout... and even short production runs.

Their many exclusive features make Rodgers Shop Presses unusually versatile in performance... and there are several standard models and capacities to suit most every shop or plant requirement.

Other Rodgers Hydraulic Equipment is available too, for *your* special jobs.

SEND FOR CATALOGS

Complete details of Rodgers Equipment are covered in available catalogs. Write for them.



Rodgers Hydraulic, Inc.

7447 Walker St., St. Louis Park, Minneapolis 16, Minn.

HYDRAULIC POWER EQUIPMENT



reduces assembling and maintenance time

If your production line, or plant maintenance calls for nut application or removal you'll find just the right wrench in the CP line of reversible air impact wrenches.

- Powerful, compact, perfectly balanced, and with no twisting thrust to fatigue the operator, CP wrenches speed operations and cut costs.

Eight basic models provide a capacity range from $\frac{1}{4}$ " to $1\frac{3}{4}$ " bolt size, and angle head models are available to reach awkwardly located nuts, bolts and studs. Power regulators, for control of tightness, are available on all models up to $\frac{3}{4}$ " bolt size.

Write for
Bulletin 812



**CHICAGO PNEUMATIC
TOOL COMPANY**

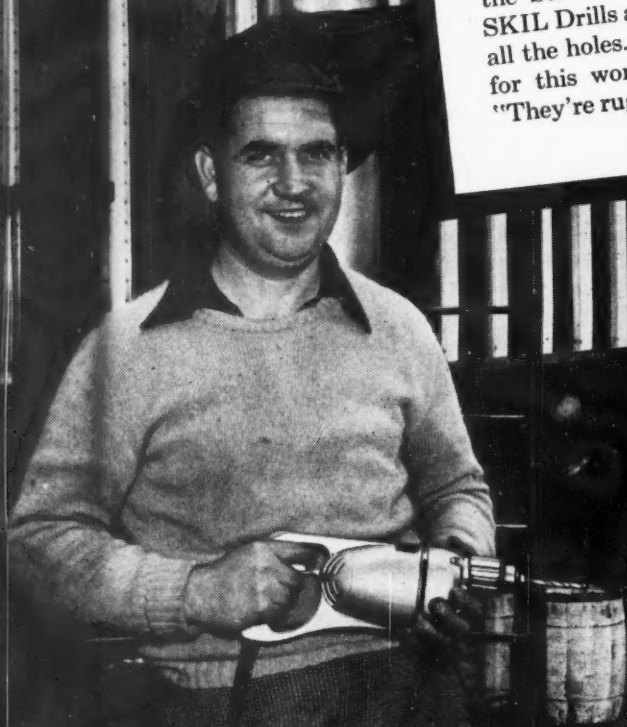
General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

"We rely on **SKIL** Drills for dependable production"

says **Frank Di Paula**,
shop superintendent, The Strick Company
Chicago, Illinois

Almost 3000 holes have to be drilled
in every freight trailer before it leaves
the Strick Company assembly line.
SKIL Drills are on the job . . . drilling
all the holes. "We prefer SKIL Drills
for this work," says Mr. Di Paula.
"They're rugged and dependable."



When there's freight to carry, there's a Strick Trailer to carry it... durable, dependable, heavy-duty trailers... custom built to meet each customer's requirements.

SKIL Drill—Model 243

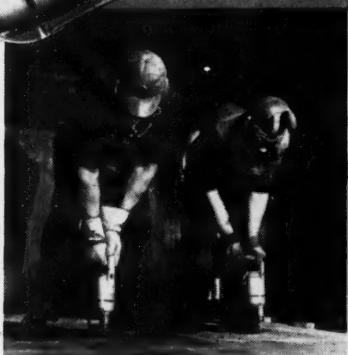
For continuous, heavy-duty jobs. Sturdily built $\frac{1}{4}$ " drill takes on the roughest, toughest jobs in metal or wood.



SKIL Drill—Model 243— $\frac{1}{4}$ " drill, heavy duty. Capacity in steel: 0" to $\frac{1}{4}$ "; in hardwood: 0" to $\frac{1}{4}$ ". No-load speed: 2000 r.p.m. Overall length: 11 $\frac{1}{4}$ ". Weight: 6 $\frac{1}{4}$ lbs.



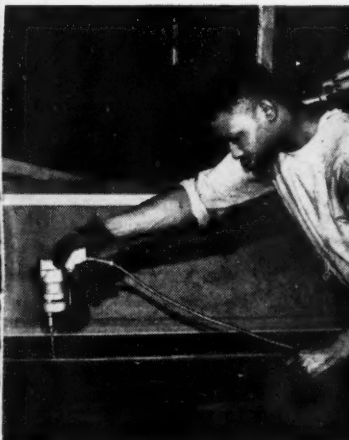
Perfectly balanced drill makes it easy for the operator to bore holes to attach the support plates.



Fast, accurate drilling through 1" oak flooring and steel cross members.



This sturdy drill makes the holes for rivets in the roof covering... gives trouble-free service in spite of constant use.



SKIL Drill—Model 47— $\frac{1}{4}$ " drill, compact heavy duty. Capacity in steel: 0" to $\frac{1}{4}$ "; in hardwood: 0" to $\frac{1}{4}$ ". No-load speed: 1800 r.p.m. standard. Overall length: 7 $\frac{1}{4}$ ". Weight: 3 $\frac{1}{4}$ lbs.

SKIL Drill—Model 47—Compact, heavy-duty $\frac{1}{4}$ " drill combines high speed and power with light weight for easier continuous drilling.

SKIL
PORTABLE TOOLS



SKIL Saw



SKIL Belt Sander



SKIL Grinder



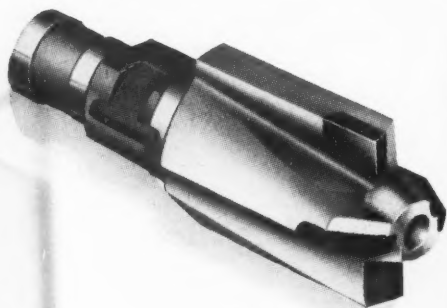
SKIL Driver

Sheet aluminum is drilled for joining. Drill handles almost as easily as pointing a finger, gets into minimum space.

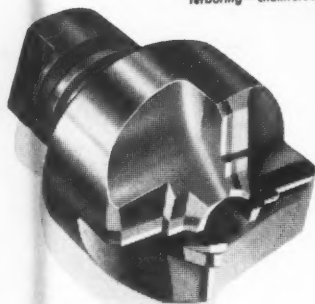
SKIL Products are made only by Skilcorp, Inc.
5033 Elston Avenue, Chicago 30, Ill.

Skilcorp Factory branches in principal cities.
In Canada: Skilcorp, Ltd., 3601 Dundas Street West, Toronto, Ont.

Take a Tip FROM US...



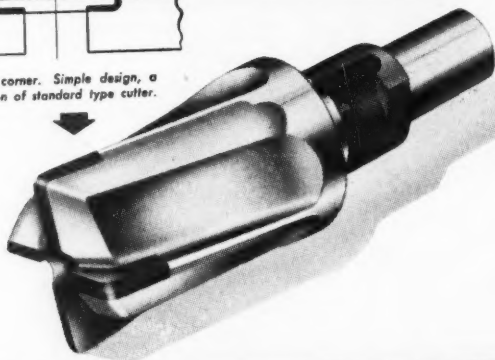
A common application in counterboring—chamfers and faces.



Used in machining aluminum alloy. Finishes five surfaces.



Radius corner. Simple design, a variation of standard type cutter.



Just try the rugged Eclipse carbide tipped tools and you'll never settle for less. Thousands of them are in daily use in production machining of steel, iron, brass, aluminum and other materials cast and forged. Eclipse engineering experience is available at all times. Send your production problems to us.

ECLIPSE COUNTERBORE CO.
Founded in 1913
DETROIT 20, MICHIGAN

Boosts Production from 66 to 500 Pieces per Hr.

Using
**PORTER-
CABLE**
*Abrasive
Belt
Machining*



PREVIOUS METHOD—Z-shaped pieces milled one at a time at rate of 66 per hour.

IMPROVED METHOD—Porter-Cable Wet-Belt Surfer with Automatic Feed Table grinds 7 pieces to exact limits in one presentation to the belt. Pieces held in simple pre-loaded jig. Production increased to 500 per hour by inexperienced operator.

Porter-Cable Abrasive Belt Machines step up production on all these operations:

Machine Flats
Grind Contours
Centerless Grinding
Generate Radii
Chamfer and Bevel
Burr, Polish
Smooth Parting Lines

A Complete Line:

Platen Grinders • Contour Grinders •
Contact Grinders • Centerless Grinders
• Free-Belt Grinders • Bench Grinders

WITH abrasive belt machines, surfacing operations in great variety show time savings that are outstanding—from simple burring to precision machining.

Porter-Cable has developed wet-belt and dry-belt units to suit different materials and different purposes. This abrasive belt process is revolutionary—does jobs you'd never think possible; lends itself to ingenious operations; adapts simplest, inexpensive fixtures; secures exceptional finish, often works with free-hand feed.

Free... You'll be amazed when you look over the facts in "Abrasive Belt Finishing"—information that's yours on request. Send coupon opposite.

PORTER-CABLE MACHINE CO.

5068 N. Salina St., Syracuse 8, N. Y.

Please send me copy of your folder, "Abrasive Belt Finishing"

Name

Firm Name

Address

City

State

Mfgs. of SPEEDMATIC and GUILD ELECTRIC TOOLS

In Canada, write Strongbridge, Ltd.

WHAT METAL CUTTING CAPACITY DO YOU NEED?

Kalamazoo BAND SAWS

3 SIZES TO MEET YOUR REQUIREMENTS



Intermittant or continuous production cutting model — medium, large, or extra big capacity — you name it, Kalamazoo has it! 3 sizes in both standard and coolant models — a saw for every need.

On the left, the Kalamazoo 816-C (coolant model) takes up to 8" rounds, tubes, pipe; up to 8" x 16" bars and angles. Cuts them fast, smooth, accurately — with no burr, minimum kerf. Also available as Kalamazoo 824 standard or coolant models with 8" round capacity and 8" x 24" flat capacity.

On the right, Kalamazoo Model 610-S—fast, rugged, and accurate, with a host of exclusive features for finer performance. Takes rounds, tubes, and pipe up to 6" diameter, bars and angles up to 6" x 10". Outstanding low-cost saw on the market. Uses any standard motor $\frac{1}{3}$ HP, 110/60/1. Same capacity with coolant equipment as Model 610-C. Write today for complete information on any model.

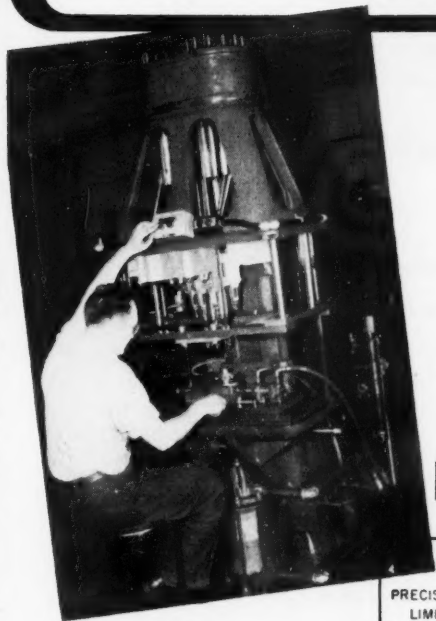


MACHINE TOOL DIV. *Kalamazoo* TANK and SILO CO.

822 HARRISON ST., KALAMAZOO, MICH.

Hanna® Cylinders and Valves

Provide Continuous, Automatic Drillpress Cycle



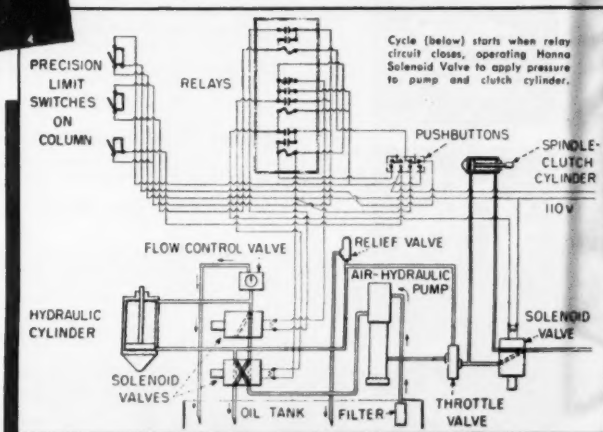
One pushbutton starts the Natco cycle that drills bonnet and body castings for various size valves—and Hanna Cylinders, Valves and other interlocking electrical controls do the rest, to make this drillpress fast, dependable and accurate.

This is only one of hundreds of applications for Hanna Cylinders and Valves in all types of machines and equipment to accelerate production and reduce operation cost. It will pay you to check both the machines you make and the machines in your plant to see where smooth, efficient, economical Hanna Cylinder Power can be used to improve operations. Our engineers will be glad to work with you.

Drillpress operator locates work with lever that moves plate gauge, then punches start button overhead. Hanna Hydraulic Cylinders feed the table, and Pneumatic Cylinders engage both the drillpress clutch and the workpiece clamp in the fixture.



For full information on Hanna Hydraulic Cylinders, Pneumatic Cylinders and Valves, send for descriptive catalogs.



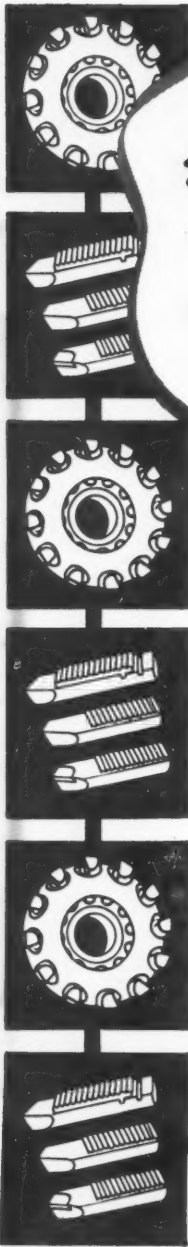
50th Anniversary 1901-1951



Hanna Engineering Works

HYDRAULIC AND PNEUMATIC EQUIPMENT . . . CYLINDERS . . . VALVES . . . RIVETERS

1758 Elston Avenue, Chicago 22, Illinois



*All Lovejoy Blades for
Type "A" Milling Cutters
are interchangeable from
4½" to 24" in diameter*

... and this applies to
every "A" cutter ever made!

Lovejoy Type "A" face milling cutter blades offer unsurpassed economy — 1) they are interchangeable throughout the complete range of housing sizes, 2) H.S.S., carbide and cast alloy blades are interchangeable in every housing, 3) every blade will fit every Type "A", even if you have housings 30 years old, 4) only a minimum of stock must be removed when sharpening, 5) a large percentage of every blade is usable; 6) there is no need to carry a large inventory, as Lovejoy can supply blades promptly from stock. For superior performance, plus maximum economy, use Lovejoy Type "A" for every face milling job.

Write for free catalog!



130 MAIN ST., SPRINGFIELD, VERMONT

LOVEJOY
TOOL COMPANY, INC.

Standard Model—

MODERN
Henley

16", 18-speed engine lathes — for precision turning

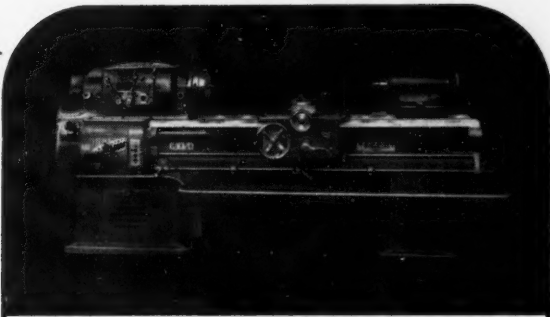


FEATURING induction hardened and ground precision bed ways

PLUS —

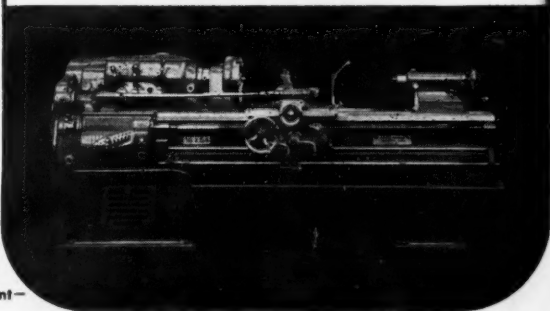
18-Speed Sealed Precision Geared Head.
Quick Change Gear Box Mechanically Oiled.
36 Thread Cutting and Feed Changes.
1½ to 80 Threads—.003 to .1666 Feeds.
Alloy Steel Gears in Headstock.
Gears Refinished After Heat Treatment.
Gear Shafts Mounted in Anti-Friction Bearings.
Anti-Friction Spindle Bearings Double Opposed, Pre-loaded.
Spindle End Indexed for Multiple Thread Cutting Without Disturbing Gear Train.
Apron and Carriage, Automatically Lubricated.
Quick Acting Levers Operate Longitudinal and Cross Feeds.
Feed and Split-nut Levers Interlocking and Fool Proof.
Quick Withdrawing Attachment for Threading.
Large Hole thru Spindle Accommodating Large Collet Capacity.
Spindle Nose Optional; Flanged Type Cam Locking, Long-taper Type Key Driven, Henley Standard Threaded Nose.
Lathe Equipped with the New High Speed Apron Reverse for Lead Screw.
New Feed Dials, Large, Accurate and Quick Reading.
Micrometer Carriage Stop; Automatic Longitudinal Stops in Either Direction of Travel.
New Positive Cross Slide Stop.
New Re-inforced Bed Brackets with Anti-friction Bearing for Tail End of Lead Screw.
Special Clamping Device for Tailstock.

**Tool Room Model
with sub-headstock
& relieving attachment—**

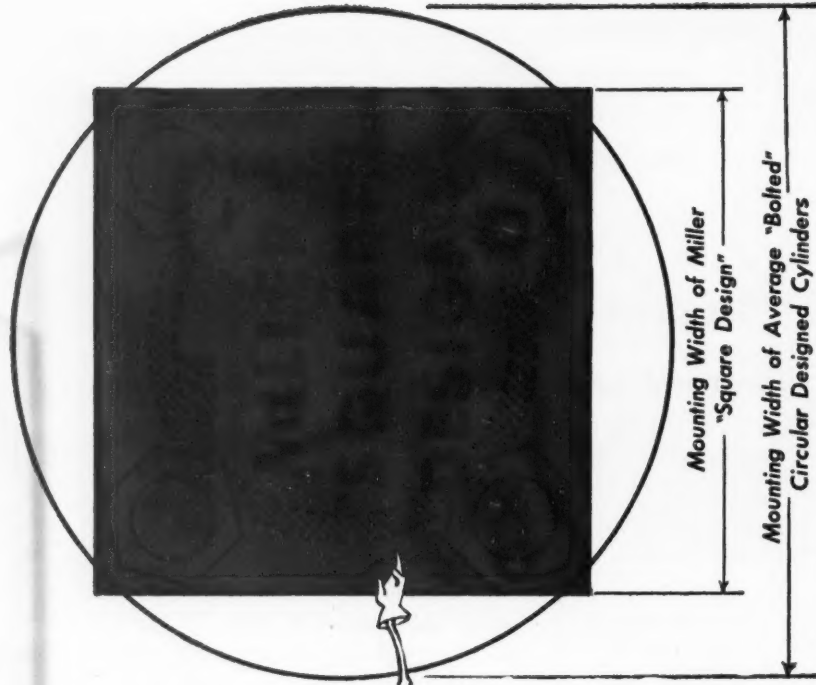
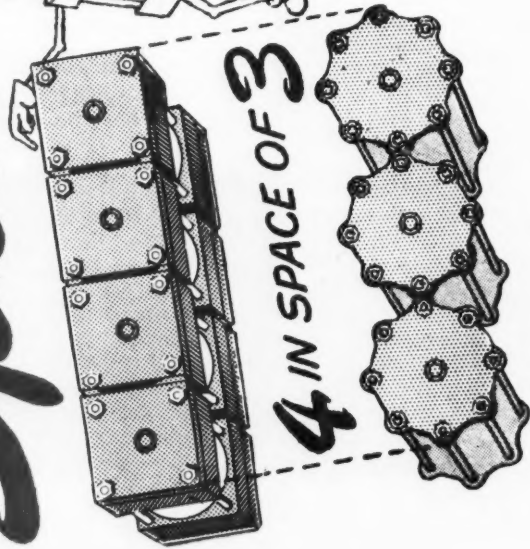


Every feature necessary for precision turning at modern production speeds is incorporated in the 16-inch, 18-speed Henley engine lathe — in other words, *Built to Henley's Modern Precision Standards.* The operator will find every convenience—from easy-operating controls to features that practically eliminate maintenance. Induction hardened and precision ground bed ways provide life-long precision for both carriage and tailstock. This modern Henley Tool Room Lathe is available in standard and tool room models. The latter is shown below with sub-headstock for producing threads with long leads. *Write for catalog.*

THE HENLEY MACHINE COMPANY
MAIN OFFICE & PLANT: TORRINGTON, CONN.
BRANCH OFFICES: New York, Chicago, Boston, Detroit,
Rochester, Los Angeles, San Francisco
REPRESENTATIVES: Philadelphia, Cleveland, Pittsburgh



Save Space



Air and Hydraulic



CYLINDERS...

The SQUARE DESIGN of Miller Cylinders saves up to 25% of mounting space, permitting more cylinder power in the same space and easier, more convenient installation in "tight spots." Thus, in many cases, machines and equipment can be designed more compact and less costly by using Miller Cylinders. Hours of drafting time can be saved — as only a few straight lines show any view on drawings.

The illustration at upper left shows graphically how *four* Miller Cylinders can be mounted, bore for bore, in the same space required for *three* average "bolted" circular designed cylinders. Some Miller bore sizes permit even greater space-savings.

Other important *standard* features of all Miller Cylinders include: solid steel heads, caps and mountings, hard chrome plated piston rods, dirt wiper seals, and other "quality" features as shown in illustrated bulletins sent FREE on request. Remember, too, that Miller Hydraulic Cylinders (2000-3000 psi) meet the J. I. C. Hydraulic Standards.

Write for illustrated cylinder bulletins A-105 and H-104

COMPLETE MILLER CYLINDER LINE INCLUDES: AIR CYLINDERS, 1/4" to 20" BORES, 200 PSI OPERATION; LOW PRESSURE HYDRAULIC CYLINDERS, 1/4" TO 8" BORES FOR 500 PSI OPERATION, 8" TO 14" BORES FOR 250 PSI; HIGH PRESSURE HYDRAULIC CYLINDERS, 1/4" TO 12" BORES, 2000-3000 PSI OPERATION. ALL MOUNTING STYLES AVAILABLE.



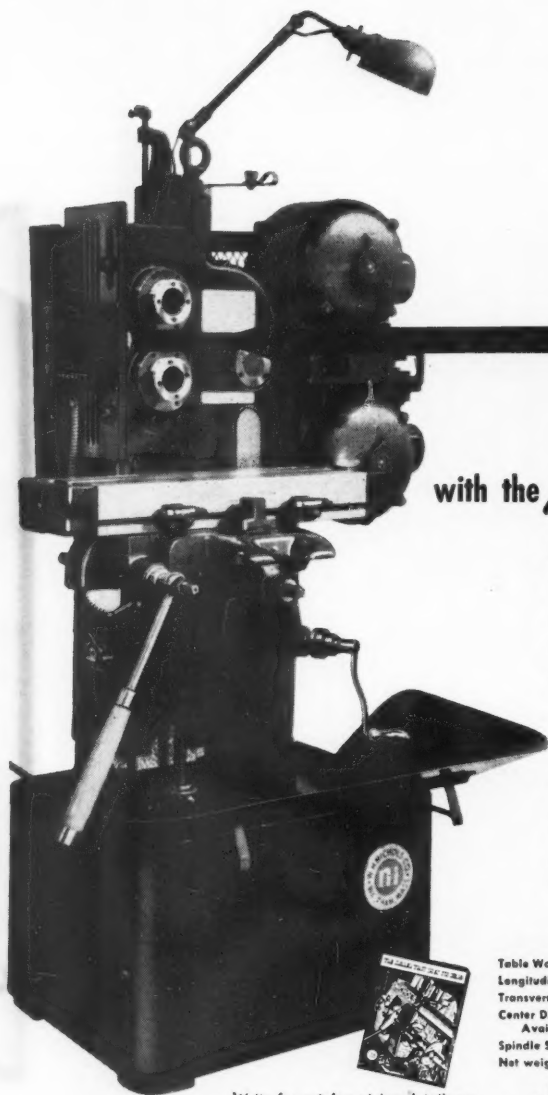
MILLER MOTOR COMPANY

2024 N. HAWTHORNE, MELROSE PARK, ILL.

AIR AND HYDRAULIC CYLINDERS ACCUMULATORS COUNTERBALANCE CYLINDERS RODS/VALVES AIR HOISTS

CLEVELAND — PITTSBURGH — PHILADELPHIA — DETROIT — YOUNGSTOWN — BOSTON —
HARTFORD — NEW YORK CITY — DAYTON — ST. PAUL — FORT WAYNE — INDIANAPOLIS —
MILWAUKEE — NASHVILLE — SEATTLE — LOS ANGELES — SAN FRANCISCO — BALTIMORE —
ST. LOUIS AND OTHER AREAS.

Sales and Service from coast to coast



TWO FOR ONE

with the *Nichols* Double-Decker!

The Nichols "Double-Decker" Two-spindle Miller actually gives you two milling operations in one pass! It is equally adaptable to small or large lot production of small parts where parallel flats or grooves, or opposed faces cannot be straddle milled, or otherwise must be indexed for two operations with a single cutter. Its time-saving features are readily apparent. Spindles may be separated from 4" to 7" (or more) to accommodate various sizes of cutters and work. Table can be arranged for hand operation or with automatic work cycle, and with high or low spindle speeds.

CONDENSED SPECIFICATIONS

Table Working Surface	6 $\frac{1}{2}$ " x 21"
Longitudinal Travel	10"
Transverse Travel	7"
Center Distance of Spindles Available Between	3 $\frac{1}{2}$ " and 14 $\frac{1}{2}$ "
Spindle Speeds Available	up to 5000 R.P.M.
Net weight approx.	1250 lbs.

Write for catalog giving details on lever, screw and air-feed models, plus three types of double spindle Nichols Millers.

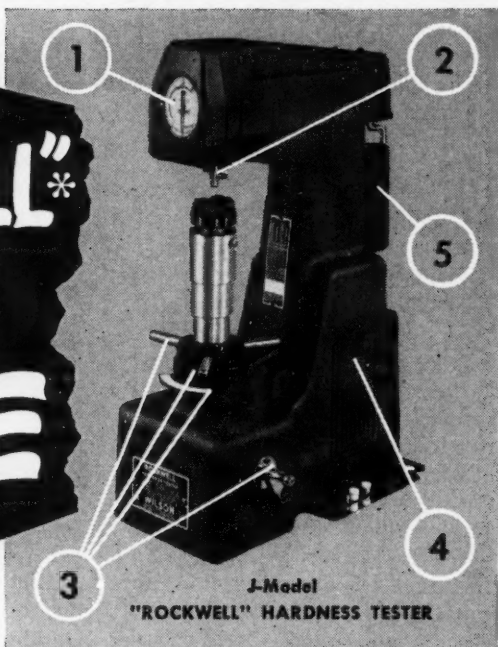
Inquiries must be submitted in detail, as specifications and capacities are governed by user's needs.

MANUFACTURED BY W. H. NICHOLS COMPANY WALTHAM, MASSACHUSETTS

NATIONAL DISTRIBUTORS **NICHOLS-MORRIS CORPORATION**

50-H CHURCH ST.
NEW YORK 7, N. Y.

**"ROCKWELL"
...to be
SURE**



You NEED these features to assure accuracy and speed in hardness testing

- 1 Totally enclosed, dirt and dust-proof "Zerominder" dial gauge
- 2 Gripsel clampscrew for quick change and proper seating of penetrator
- 3 All controls grouped conveniently under capstan handwheel
- 4 Enclosed, easy-to-reach variable speed dash pot
- 5 Standardized weights

The J-Model improved "ROCKWELL" Hardness Testers have higher sensitivity, increased speed, and are simpler to operate.

Most specifications today call for parts with certain hardness limits. If you test incoming materials, you know if they meet your production requirements. You know there will be fewer rejects.

"ROCKWELL" Hardness Testers are made in two types (Regular and Superficial) and many styles with accessories so they can be adapted to testing flats, rods, rounds, and odd shapes. There is also the TUKON for micro-indentation hardness testing. Tell us the nature of the test you contemplate, and we will recommend the machine best suited to the work.

**Trade Mark Registered*

ACCO

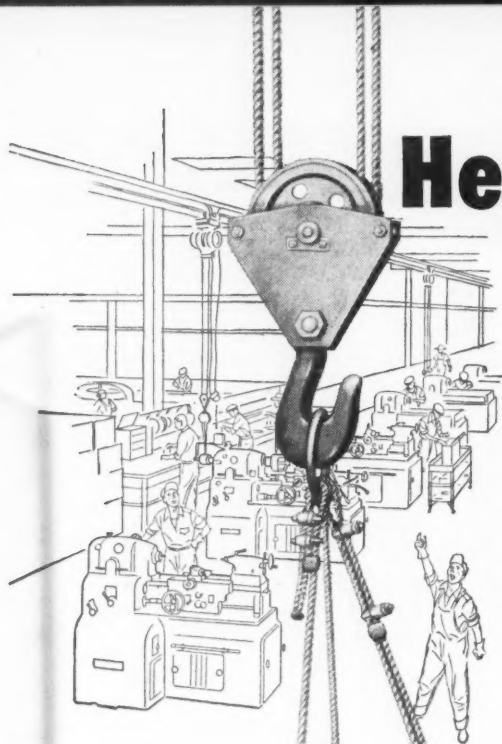


WILSON

**MECHANICAL INSTRUMENT DIVISION
AMERICAN CHAIN & CABLE**

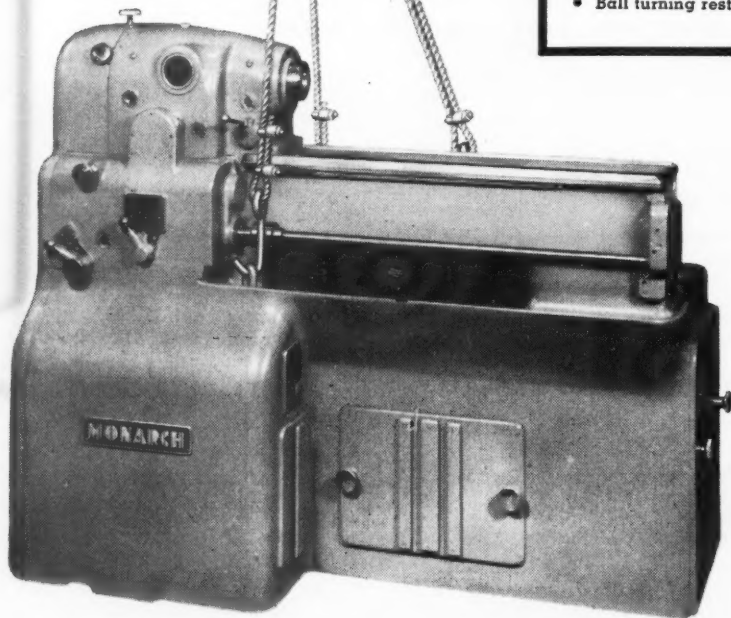
230-G Park Avenue, New York 17, N. Y.

Here's Where



TYPICAL EQUIPMENT

- "Air-Gage Tracer"
- Steady rest
- Follow rest
- Taper turning attachment
- Collet attachments
- Air equipment
- Bar feed attachment
- Collet chucks
- Jaw chucks
- Step chucks
- Stops
- Micro-gaging diameter dial
- Hexagon power feed bed turret
- Hand operated cut-off slide
- Variable feed control
- Ball turning rest



You Come In!

That's right—from here on you can just about write your own ticket! Think of the most exacting assignment for small lathes anywhere along your production lines. Then tell us! We'll deliver a high-speed, sensitive Monarch 10" Model EE—a lathe with an inbuilt productivity matched only by its versatility—and you'll get it with just the equipment and accessories to step up standards for that job.

Note the listing of typical equipment (left). An extraordinarily large choice is available, making it possible for the user to select the ideal combination for the utmost productivity on *his* class of work. The Model EE is equally adaptable for a

wide variety of between center and chucking operations. Note, too, that it can be supplied with the most accurate lathe duplicating method ever devised—the Monarch "Air-Gage Tracer."

These many variations in equipment have been developed solely in response to industry's demands that we make the basic Model EE design available for widening uses. Could anything we say speak better for its design and specifications? Some place—*many* places, perhaps—this outstanding Monarch lathe can improve your production at lower cost. Send the coupon today for full details.....
The Monarch Machine Tool Company, Sidney, Ohio.

FOR A GOOD TURN FASTER...TURN TO MONARCH



THE MONARCH MACHINE TOOL COMPANY, Sidney, Ohio.

Gentlemen: Please send me without obligation your Booklet No. 1003 covering the Monarch Precision Manufacturing Lathe—Model EE.

(It's that new one with 28 pages and a host of those sparkling Monarch illustrations.)

NAME _____

COMPANY _____

TITLE _____

ADDRESS _____

CITY _____

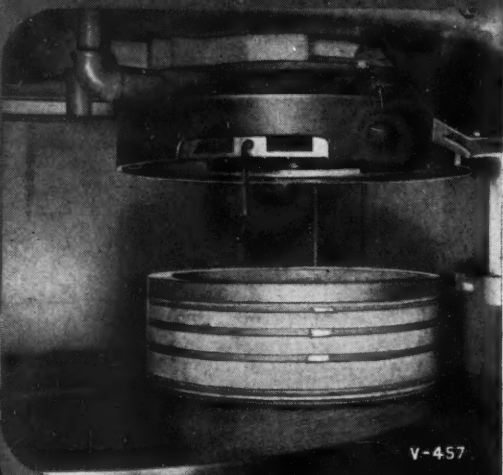
ZONE _____

STATE _____

So easy!

lower head
onto wheel
and clamp-

for your BLANCHARD



V-457

-then grind!

Blanchard wheels are engineered for Blanchard Grinding

The NEW Blanchard Wheel Holder eliminates sulphuring — try it with Blanchard wheels and be convinced that it will —

**SAVE TIME
SAVE MONEY
SAVE TROUBLE**

See your Blanchard distributor or
write direct for full information!

PUT IT ON THE



THE BLANCHARD MACHINE COMPANY

44 STATE ST., CAMBRIDGE 39, MASS., U.S.A.



*no other
has so firm a grip...*

Thanks to its ball bearing construction and frictionless grip, the Jacobs Ball Bearing Chuck easily registers the world's firmest grip . . . eliminating tool slippage and reducing drill breakage. That is why it is preferred the world over for heavy-duty drilling under toughest conditions.

*no other
is so widely used...*

The Jacobs Plain Bearing Chuck is especially designed for portable drills, light- and medium-duty drill presses and lathes. Its high accuracy, rugged construction, tremendous strength and gripping power have made it industry's overwhelming favorite, here and abroad.

See your Industrial Distributor for the complete line of Jacobs Chucks. The Jacobs Manufacturing Company, West Hartford 10, Connecticut.

IF IT'S A

JACOBS

IT HOLDS

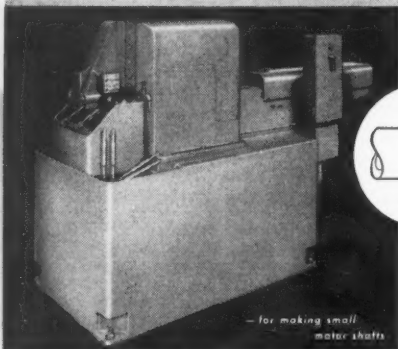
MOTCH & MERRYWEATHER

Cam Automatics-

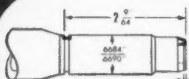
HOPPER LOADING OR BAR FEED

• **COMPLETELY AUTOMATIC** •

**TWO SPINDLES CONTROLLED
BY ONE MAIN CAMSHAFT**



— for making small
motor shafts

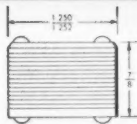


MOTOR SHAFTS

Operation: Turn, neck and chamfer.

Material: Steel tubing.

Production: 1400 pcs/hr. @ 100% efficiency.

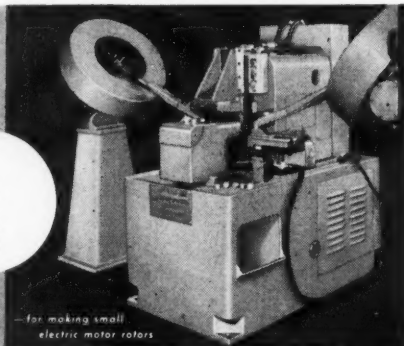


SMALL MOTOR ROTORS

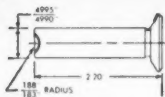
Operation: Turn O. D. and chamfer one end.

Material: Laminated silicon steel.

Production: 800 pcs/hr. @ 100% eff.



— for making small
electric motor rotors

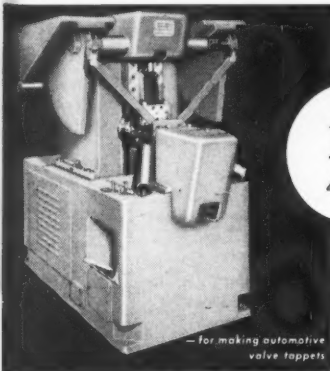


VALVE TAPPETS

Operation: Radius, neck and chamfer.

Material: 5120 steel.

Production: 2400 pcs/hr. @ 100% efficiency.



— for making automotive
valve tappets

Stock feed, loading and locating mechanisms, collets and feeds of tool slides are controlled mechanically by a single camshaft — *simplicity itself*. M. & M. cam automatics require minimum attention and only occasional checking of work-pieces. If you will submit your drawings and specifications, we will tell you how Motch & Merryweather cam automatics can increase your production with accuracy.

Manufactured by

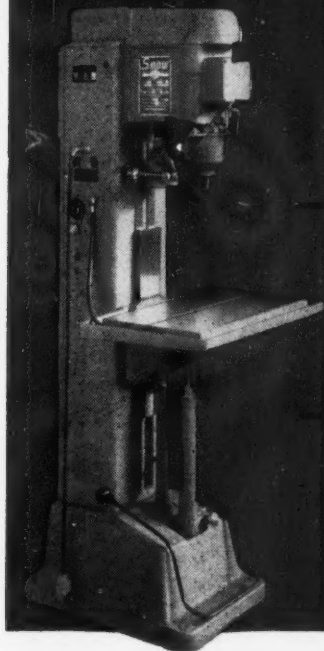
THE MOTCH & MERRYWEATHER MACHINERY COMPANY
715 PENTON BUILDING • CLEVELAND 13, OHIO

Builders of Circular Sawing Equipment, Production Milling, Automatic and Special Machines

PRODUCTION WITH ACCURACY MACHINES AND EQUIPMENT



*For Top
Production.*



Snow air operated—electrically controlled machines have built in full universal controls that allow selection of the type of spindle cycle desired. This feature also permits instant synchronization of the standard Snow Master Fixtures. All types of air operated automatic and semi-automatic jigs and fixtures are carried in stock. Standardization permits low cost tooling—and—high production.

Sensitivity of power application prevents tool breakage.

Simplicity of control means that set up and operation can be handled by a less experienced operator with minimum fatigue.

Submit Sample Parts for

SNOW

FULL UNIVERSAL MACHINES

Air operated, electrically controlled Snow tools are establishing amazing production records daily on a wide variety of work. Just note these typical examples:

DRILLING

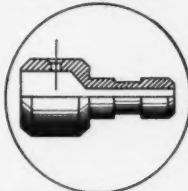
Crossdrill and C" T" Sink 1/16" Hole

Material—Brass

Production—4800 per hour

Fixture—#15 Vertical index

Equipment—#1-UD Drilling Machine



TAPPING

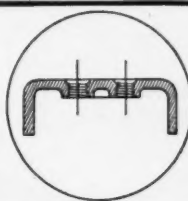
Tap Two #10-32 Holes

Material—Steel stamping

Production—3800 tapped holes per hour

Fixture—#14 horizontal index

Equipment—#1-UT tapping machine



THREADING

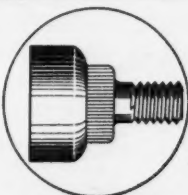
3/8"—24 Thread—1/2" Long

Material—Die Cast Aluminum

Production—2500 per hour

Fixture—#10 Drum dial

Equipment—#3-TR Threading machine

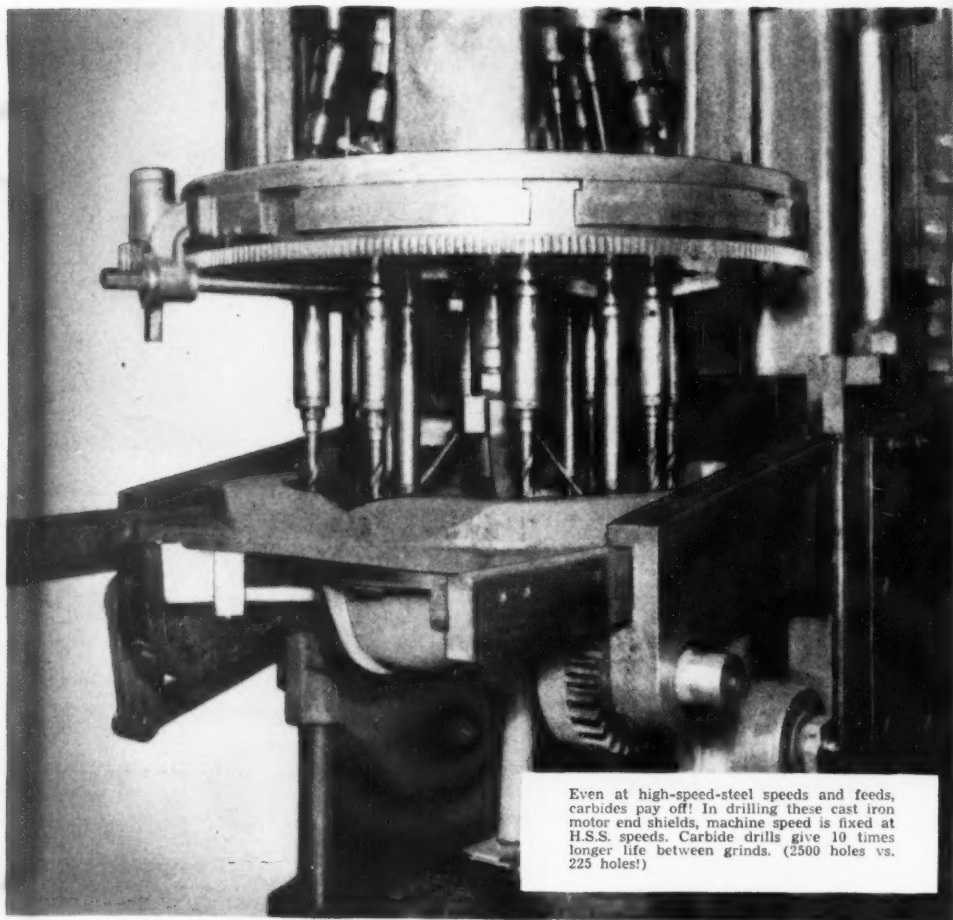


SNOW

MANUFACTURING COMPANY
435 Eastern Ave., Bellwood, Illinois
(Chicago Suburb)

Single Spindle Verticals • Two-Spindle Verticals • Two-Spindle Horizontals • Automatic Nut Tapping Machines • Drill Press Tap Heads • Automatic & Semi-Automatic Jigs & Fixtures

How to Drill Cast Iron



Even at high-speed-steel speeds and feeds, carbides pay off! In drilling these cast iron motor end shields, machine speed is fixed at H.S.S. speeds. Carbide drills give 10 times longer life between grinds. (2500 holes vs. 225 holes!)

***CARBOLOY®**
CEMENTED CARBIDE

with Carbide Twist Drills

Send for this free data!

Exhaustive tests, as reported in the trade press, confirm what some plants have long known: Cast iron can be successfully and profitably drilled with *Carboloy Grade 44A. Sound technical data now available.

(Although the Carboloy organization does not make drills, this message is published as a service to the metalworking industry in the interests of the defense program.)

Exhaustive laboratory tests, plus actual use by many plants, show that by simply applying basic cemented carbide principles of use, carbide-tipped twist drills can deliver sensational results in the drilling of cast iron.

Recent articles in the trade papers demonstrate this. Users report doubled production . . . more than tripled drill life over high-speed steel drills without special drilling equipment or individual job engineering.

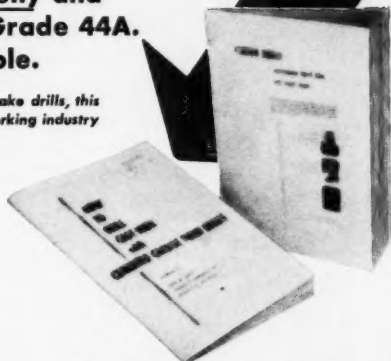
Complete data from tests and other sources have been gathered by Carboloy engineers. Tried and proved methods of proper carbide technique to speed cast-iron drilling . . . give you the same outstanding benefits in drilling cast iron that you get with cemented carbides on your other metalworking jobs.

For carbide-tipped twist drills, contact your distributor or drill manufacturer. The Carboloy organization does not make carbide twist drills . . . supplies only the high-quality cemented carbide needed for their manufacture.

However, we will be glad to supply you with the latest technical data on proper application and technique, and assist you wherever possible in applying Carboloy Cemented Carbide Grade 44A to your cast-iron drilling jobs. Send coupon for free technical data illustrated.

*Carboloy is the trademark for the products of Carboloy Department of General Electric Company

CARBOLLOY
DEPARTMENT OF GENERAL ELECTRIC COMPANY



"How to Drill Cast Iron With Carbide Twist Drills." Contains technical data on speeds and feeds, equipment, operating conditions, and other information needed for top drilling results.

Reprint of results of recent development work as reported in *Iron Age*, May 31 issue. Contains tests and practical job applications on proper use of carbide in cast-iron drilling.

FREE . . . Latest technical data on HOW TO DRILL CAST IRON WITH CARBIDE TWIST DRILLS

SEND COUPON TODAY FOR FREE DATA!

CARBOLLOY
Department of General Electric Company
11143 E. 8 Mile Street, Detroit 32, Michigan

Dear Sirs:

Without obligation, please send us _____ sets of reprints of technical articles on how to drill cast iron with cemented carbide twist drills.

Name _____ Title _____

Company _____

Address _____

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*Take this Straight
from the
FEED-BAG!...*





MORSE uses Morse Milling Cutters to make Morse Cutting Tools

*Yes, it's good horse-sense to buy Morse! For every day in the Morse plant, Morse Milling Cutters turn out thousands of cutting tools, made of the toughest tool steels. And this means that you . . . when you buy Morse Cutters . . . can know for sure that you're buying *Top Quality* that lasts longer . . . cuts smoother . . . and delivers more pieces per grind.*

So just keep in mind that if you want Morse Quality and productivity, *you've got to buy Morse Milling Cutters.* And your Morse

Franchised Distributor is stocked to serve you *now* with the right cutters for your job . . . whether they be Angle, Form, Woodruff Key-seat or Saws for slitting and slotting . . . regular or Electrolized. Call your Morse-Franchised Distributor for the cutters that cut deepest into milling costs.

Morse Twist Drill & Machine Company

NEW BEDFORD, MASS.

(Div. of VAN NORMAN CO.)

Warehouses in New York, Chicago, Detroit, Houston, San Francisco

MORSE

Cutting Tools



1. CATALOG BL
featuring Wales
Type "BL" Hole
Punching Units
for punching
mild sheet steel
up to 1/8" thick.
2. CATALOG C
featuring Wales
Type "C" Hole
Punching
Units for punching
angles, channels,
and extrusions
up to 1/8" thick.

WALES

before punching or notching
angles, channels, extrusions
and sheets - BY ANY METHOD



3. CATALOG CD featuring Wales Type "CJ" Hole Punching Units for punching holes over the entire sheet in mild steel up to 1/4" thick.

4. CATALOG CJ featuring Wales Type "CJ" Hole Punching Units for punching holes over the entire sheet in mild steel up to 1/4" thick.

5. BULLETIN G featuring Wales Type "G" Hole Punching Units for punching mild steel up to 1/2" thick.

6. CATALOG N featuring Wales Type "N" Notching Units for notching mild steel up to 1/4" thick.

7. "THE GROWTH OF AN IDEA" BULLETIN describes and illustrates the evolution of Wales Equipment and what it will do for you.

● Save your valuable time and effort in designing and building special hole punching and notching dies by calling on **Wales-Strippit FIRST** for their recommendations. A large percentage of the time of Wales engineering staff is spent in consultation... in recommending... and in developing applications for Wales independent, self-contained **STANDARD** Hole Punching and Notching Equipment. Wales Service Engineers are strategically located throughout the country. Tap their wide experience by putting your fabrication problems up to them **TODAY**.

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Fill in coupon below and have Wales fully-illustrated, functionally colored catalogs at your finger tips.

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GEORGE F. WALES, Chairman

398 PAYNE AVE., NORTH TONAWANDA, N. Y.

(Between Buffalo and Niagara Falls)

WALES-STRIPPIT OF CANADA LTD., HAMILTON, ONTARIO

Specialists in Punching and Notching Equipment

WALES-STRIPPIT CORPORATION
398 Payne Avenue, North Tonawanda, N. Y.

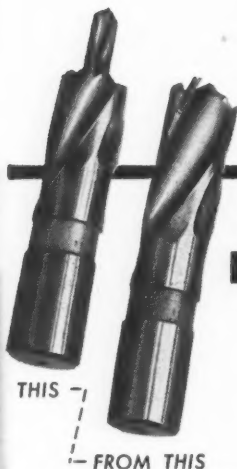
Kindly send to my personal attention the catalogs checked below:—

- ☐ 1. CATALOG BL ☐ 3. CATALOG CD ☐ 5. BULLETIN G
☐ 2. CATALOG C ☐ 4. CATALOG CJ ☐ 6. CATALOG N
☐ 7. "THE GROWTH OF AN IDEA"

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Now

PRODUCE SPECIAL TOOLS SPIRAL OR STRAIGHT FLUTES from other tools or from solid steel

in your shop

OTHER USES IN YOUR SHOP:

- GRIND RADIAL OR FORM RELIEF
- GRIND RADIAL AND FORM RELIEF AT ONCE
- GRIND OUT FLUTES
- GRIND FORM TOOLS WITH SPIRAL FORM RELIEF
- GRIND RELIEF ON O.D. AND FACE OF STEP TOOLS AT SAME TIME WITH .005" MAX. RADIUS IN CORNER

Also used as motor-driven head-stock for grinding straight or tapered cylindrical work.

When the need comes up for a special spiral-fluted cutting tool in your shop, you can make it quickly and accurately if you have the Detroit Reamer Circularity-Grinding Attachment. Tools can be produced complete with any number of flutes up to 24 and any length . . . they can be produced from other tools or from a solid piece of steel. This attachment is also valuable for grinding relief on all cutting tools, whether straight-fluted, spiral-fluted or straight or tapered.

The Circularity-Grinding Attachment fits on any standard cylindrical or cutter grinder and is easily set up for any job. All tools produced from the same set-up are identical and set-ups can be duplicated again and again by merely resetting the scales provided on the attachment.

Think of the savings in time and money when you can produce your own "specials" in any quantity . . . easily, quickly, inexpensively.

Send for Bulletin



DETROIT REAMER & TOOL CO.

Mfrs. of Special High Speed Cutting Tools

2830 East 7 Mile Rd.

Detroit 34, Michigan

A GOOD SPINDLE

FOR GOOD BORING AND TAPPING . . .

Here's a 10" tapping job
on a 5-foot "AMERICAN"
Hole Wizard Radial

It takes a sturdy, rigid machine with
plenty of power to do work like
this. Especially does it require a
rigid and smooth-acting spindle.

And that's exactly what "AMERICAN"
Hole Wizards are noted for.
Power—rigidity—convenience and
ease of control are "AMERICAN"
attributes that cut drilling, tapping
and boring costs wherever they are
put on the job.

Bulletin No. 327 tells all about
them. Want one?

THE AMERICAN TOOL WORKS CO.

Cincinnati, Ohio U.S.A.

Lathe and Radial Drills

Tool up Quick
... Cut Faster



with—

CARMET

CARBIDE METAL STANDARD TOOLS AND BLANKS

Need cutting tools in a hurry? Just name the standard styles and carbide grades desired . . . get prompt shipment from a big stock *near* you.

Our line of carbide "standards" is complete. It covers 90% of all single-point operations. CARMET standard tools come ready to use . . . easy to modify for special purposes, by grinding. Style C, illustrated, is designed particularly for conversion into various shapes for numerous applications.

Other standard CARMET styles also are immediately available from local stocks.

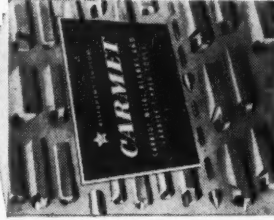
Order CARMET tools and blanks for better, faster, cheaper cutting. There is a grade to take care of every need.

• *Allegheny Ludlum Steel Corporation, Carbide Alloys Division, Wanda & Jarvis Avenues, Detroit 20, Michigan.*

SEND NOW

**for CARMET
CATALOG C-2**

... also for
price list ...
great helps when you
need tools fast.



This 28 page booklet shows the complete Allegheny Ludlum line of CARMET standard cutting tool blanks and cutting tools, with specifications. *Write today!*

ADDRESS DEPT. MS-20



For complete **MODERN Tooling**, call
Allegheny Ludlum

**at the comfort level
you can see what you're doing**



THE CINCINNATI
GILBERT
MACHINE TOOL COMPANY

RADIALS • HORIZONTAL BORING MILLS • ACCESSORIES

Notice the "wide angle visibility" the Gilbert radial operator has with the head at the "comfort level": (most convenient working height). It means better, faster work and less operator fatigue. You see, in the Gilbert-type head the spindle and the controls are closest to the arm, and the head is normally above the operator's convenient view of the work. So, for a given work height, the Gilbert arm is lower than usual. Deflection is reduced. Accuracy is improved. Dozens more design refinements make Gilbert radials *do more work* and pay a higher return on your investment. For full information on this machine see Bulletin 349. Write for it today, on your letterhead, please . . . The Cincinnati Gilbert Machine Tool Co., 3360 Beekman Street, Cincinnati 23, Ohio.

THOSE WHO BUY GILBERT BUY GILBERT AGAIN



Experienced Engineering Counsel . . .

The Center of a Successful Tooling Program

Years of successful experience in *special* tooling and related production problems are yours for the asking. When the job requires *special* tools call in your National Tool Co. representative. He is backed by more than 45 years experience in the engineering and manufacture of *special* cutting tools. This engineering service is yours—without obligation.

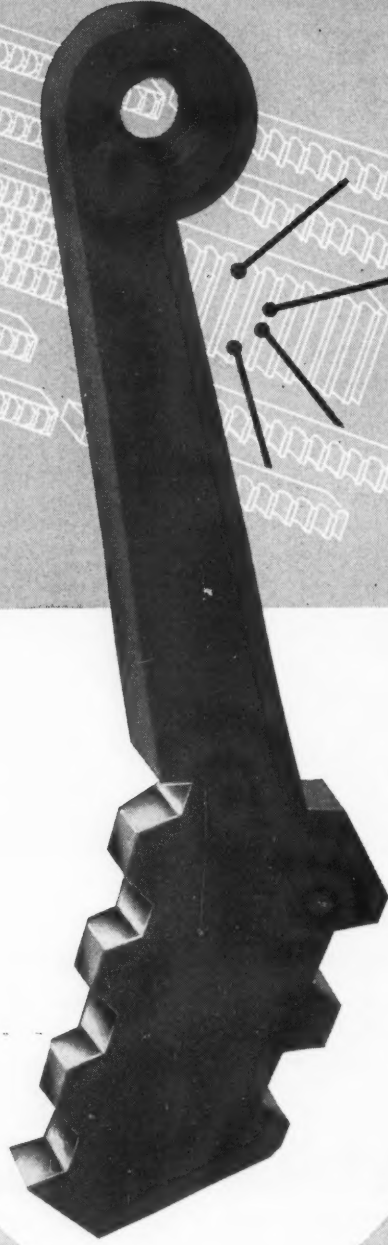
NATIONAL TOOL CO.

CLEVELAND 2, OHIO

REPRESENTATIVES IN MAJOR INDUSTRIAL CENTERS



Lower Cost-per-piece:



BROACH REDESIGN cuts tool costs \$530⁰⁰

saves on maintenance, too!

The original tooling to produce the forms on the above part incorporated each contour in a solid broach. Detroit Broach engineers recommended "breaking up" each form into individual inserts as well as rough and finish sections. The result was an immediate saving of \$530.00 per set of tools. While the rate of production remained the same, the smaller size and simplified form of each insert made tool sharpening costs drop substantially. Further, if some part of the form was damaged, only one insert, either "rougher" or "finisher"—not an entire form broach—needed replacement.

These are typical savings that can be had when broaching tools are studied by qualified specialists with an eye toward production efficiency . . . toward lowest cost-per-piece. Detroit Broach engineers are such qualified experts since they work with the design and manufacture of broaches and broaching tools exclusively. Whether your problem is a new broaching application or boosted efficiency from a present broaching job, why not get Detroit Broach to look in?

**DETROIT BROACH
CAN CUT YOUR
COST-PER-PIECE**

64

- 1 Developing broaching set-ups to replace other, more costly machining methods.
- 2 Redesign present broaches and broaching set-ups to make them more efficient.

WORLD'S LARGEST MANUFACTURER OF BROACHES AND BROACHING TOOLS EXCLUSIVELY



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Avey BMA-6 TOOL ROOM DRILL

Built in No. 2 and No. 3 Sizes

LARGE TABLE MACHINE having either Hand Feed, Power Feed, *Avey-Matic* or Reversing Motor and Control for Tapping.

This machine has proved to be very popular with Tool and Die Shop men, also production men. The large heavily ribbed table that is 34" x 25", plus ample chip trough, allows plenty of room for large dies or fixtures, plus additional space for tooling, etc. Each six-spline precision ground spindle and drive sleeve is supported by five rows of precision ball bearings which give the precision needed today and in years to come.

The machine can be obtained with either of three speed ranges: low, medium, or high. Speed ranges are easily changeable for future

jobs requiring higher or lower speeds, which is a necessity today with ever-changing design. Where power feed is desired four rates of feed are furnished.



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DEEP HOLE DRILLING MACHINES
DRILLING AND TAPPING UNITS
AUTOMATIC INDEX TABLES
SPECIAL DRILLING AND TAPPING MACHINES

THE AVEY DRILLING MACHINE CO.

CINCINNATI 1, OHIO

New ... DuraCut Abrasive Discs



*Blending weld on
stainless steel tank.*



*Smoothing weld
bead.*

IF YOU'RE LOOKING for a BETTER WAY...

... to blend welds and similar jobs, at a lower cost with greater productivity, investigate the vast possibilities of DuraCut Abrasive Discs. These new multiple layer abrasive discs, are *flexible, strong, safe*, offering many advantages over the ordinary single layer type of coated discs.

- MAXIMUM FREEDOM OF CHIP DISPOSAL (segment patterned)
- INCREASED LABOR SAVINGS (less disc changing)
- FASTER, SUSTAINED RATE OF CUT (built to grinding wheel specifications)
- 10-25 TIMES LONGER LIFE (over 1/4 million more cutting particles)
- WITHSTAND LONG CONTINUED FLEXING (extra matted reinforcing)



*Removing rust and
scale.*



*Removing weld
spatters.*



Order Today for a Trial.

Sizes available for immediate shipment
 $7 \times \frac{1}{8} \times \frac{7}{8}$ } In any of these
 $9 \times \frac{1}{8} \times \frac{7}{8}$ } grit sizes: 36, 54, 80

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Branch Offices and Warehouses — Chicago, Cleveland, Detroit, Pittsburgh
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Choose Your Wrenches as you do your friends--for life

Specify ARMSTRONG Wrenches for lifetime service, for finely balanced tools that feel right in the hand and make work easier, faster and less fatiguing. ARMSTRONG Wrenches generally are longer for size—give greater leverage. Accurately milled or broached openings give the proper clearance. They are safe wrenches because they are strong beyond need.

Drop forged and machined from high tensile carbon or special alloy tool steels, ARMSTRONG Wrenches are heat treated, tempered and tested to an exact balance of toughness, hardness and tensile strength. Each is beautiful in finish and line, is a quality tool to be proudly possessed by any mechanic—or certain to "give a lift" to any assembly line. Buy wrenches which carry the trade marks HI-TEN or ARMALLOY. On carbon or alloy steel wrenches these trade marks are your guarantee of lifetime quality.

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ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"
5228 W. ARMSTRONG AVENUE CHICAGO 30, ILL.

IN THIS
ISSUE
FEATURES

MODERN Machine Shop

AUGUST, 1951

Vol. 24, No. 3

Machining the Fordomatic

A pictorial story showing some of the more interesting machining operations now being performed in the new Ford automatic transmission plant located in Cincinnati. Page 83.

Welding the Navy's Warplanes

By Howard E. Jackson

In this article the author describes the methods used at Sand Point Naval Air Station in the testing of both new and used welded material. Page 100.

Production Operations on Buda Diesel Truck Engines, Part II

By J. Broberg

Continuing the description of the interesting machining operations involved in the building of gasoline and diesel engines. Page 108.

Handling Precision, Self-Lubricating Bearings

By Gilbert C. Close

Mr. Close explains a set of directions designed to control the handling of bearings which have been compiled by the Process Engineering Department of Northrop Aircraft, Incorporated. Page 130.

Safe Lifting is Everybody's Business

This is the first part of an actual case history of the initiation of a safety program by a progressive management concerned with the safety of its employees and interested in improving the efficiency of its material handling devices. Page 136.

Designing Drawing and Redrawing Dies

By C. W. Hinman

Mr. Hinman discusses recommended practice for drawing 18-8 stainless steel, drawing and embossing, and the drawing of large shells hydraulically. Page 154.

Processing Titanium

By Frank Charity

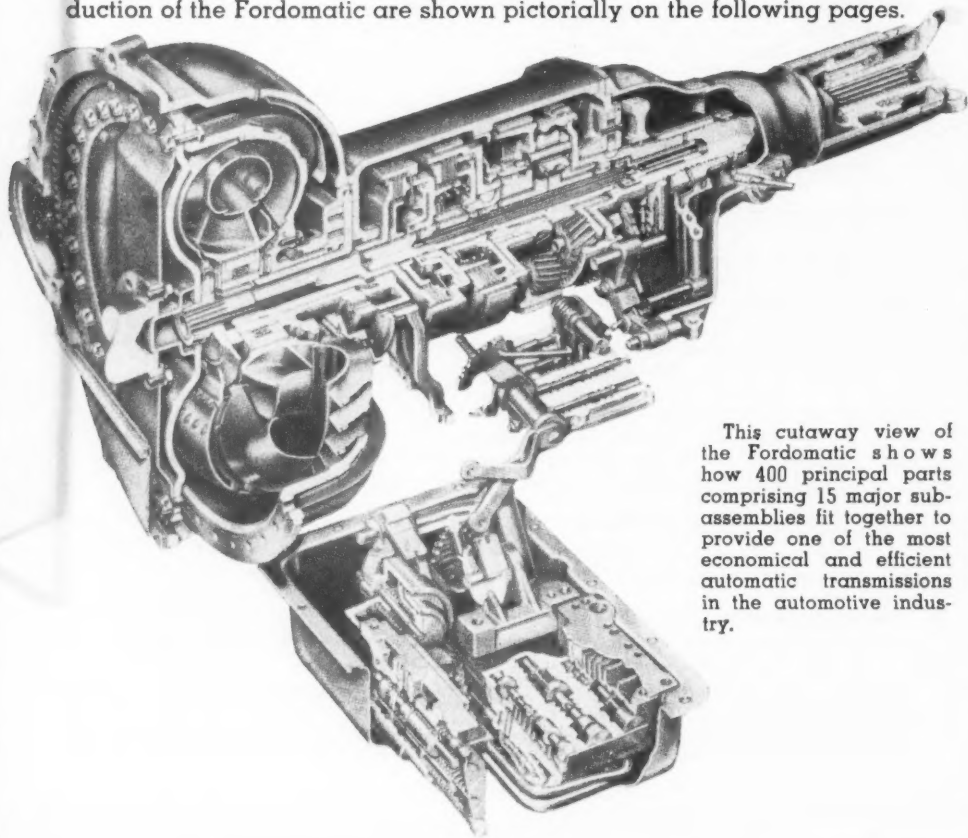
In which the author describes the experience which North American Aviation has had in their experimental work in fabricating titanium. Page 168.

Rheem Supplies Containers for Jet Engine "Canning"

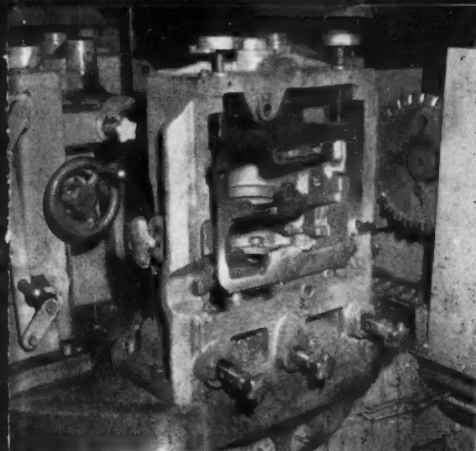
This article tells of the development of large steel shipping containers in which huge jet engines are shock-counted and sealed against humidity. Page 180.

Machining Fordomatic

THE widespread acceptance of automatic-type transmissions by the American motoring public has prompted some automobile manufacturers to allocate more and more of their available manufacturing facilities to this type of production. At the same time, some manufacturers have built new plants to provide more manufacturing floor space. One such manufacturer is the Ford Motor Company who, in anticipation of a great demand for the Fordomatic, has erected a new plant in Cincinnati which provides nearly a half million square feet of manufacturing floor space. The more interesting operations involved in the production of the Fordomatic are shown pictorially on the following pages.

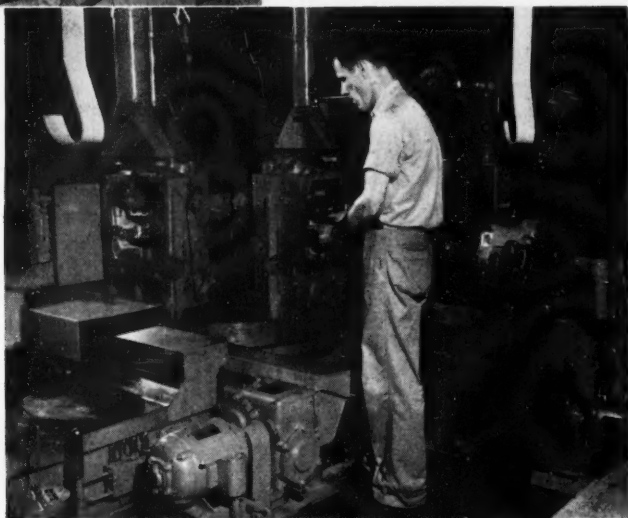


This cutaway view of the Fordomatic shows how 400 principal parts comprising 15 major sub-assemblies fit together to provide one of the most economical and efficient automatic transmissions in the automotive industry.

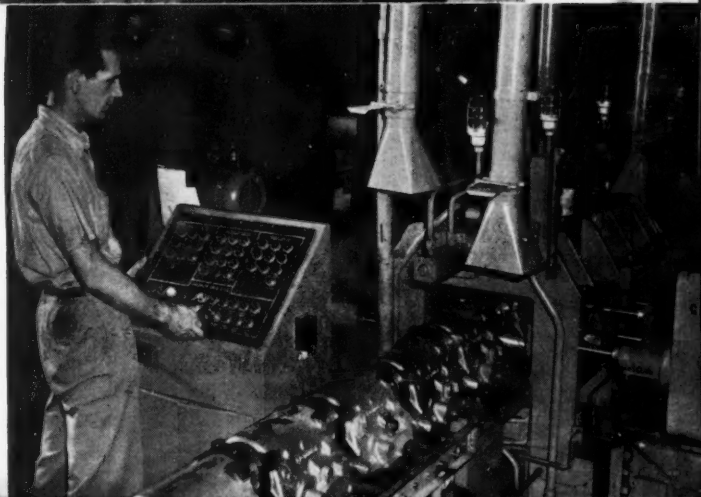


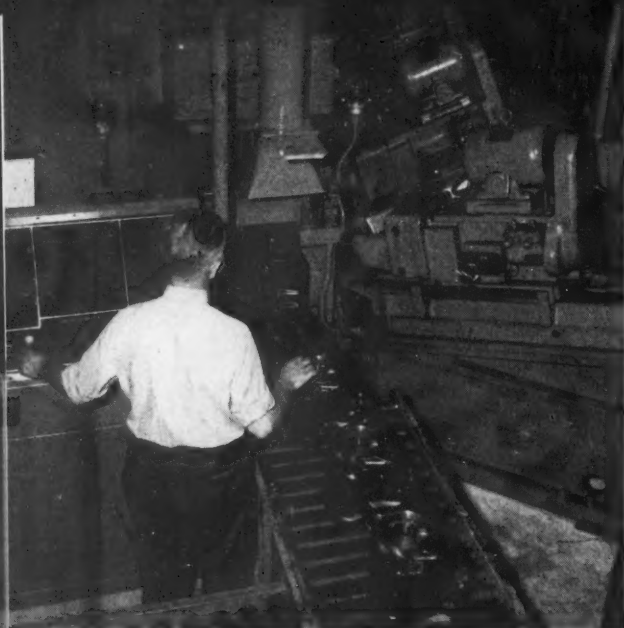
(Left) A close-up view of one of the fixtures of a special 6-spindle, 4-station Ingersoll indexing milling and drilling machine which is designed to rough and finish mill and drill the cast iron transmission cases.

(Below) A general view of the Ingersoll 4-station rotary-type machine in which the transmission case is rough and finish milled and drilled.



(Right) A view of an 11-station Greenlee automatic transfer type machine in which the transmission cases are progressively drilled, spotfaced, and tapped. The operator shown at the left can observe the proper functioning of individual units on this transfer line by means of the control panel.



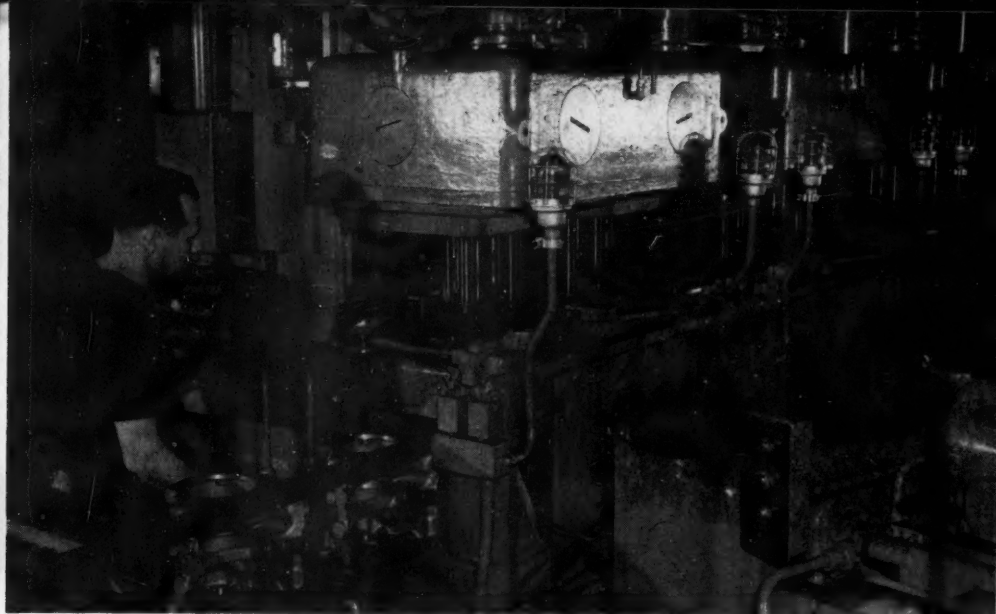


Transmission cases receive additional machining operations in the huge 26-station Greenlee automatic transfer type machine shown here. These machining operations consist of drilling, counter sinking, and reaming holes in the bottoms and rear ends of the transmission cases.



Two bearing diameters on the automatic transmission case are finish bored in the 2-way Ex-cell-O precise boring machine shown here.



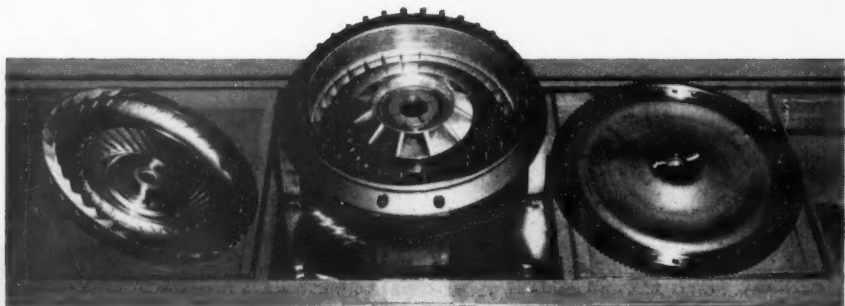


This 13-station Greenlee automatic transfer machine is used to drill, spotface, chamfer, ream, and tap holes in the sides of the transmission cases.



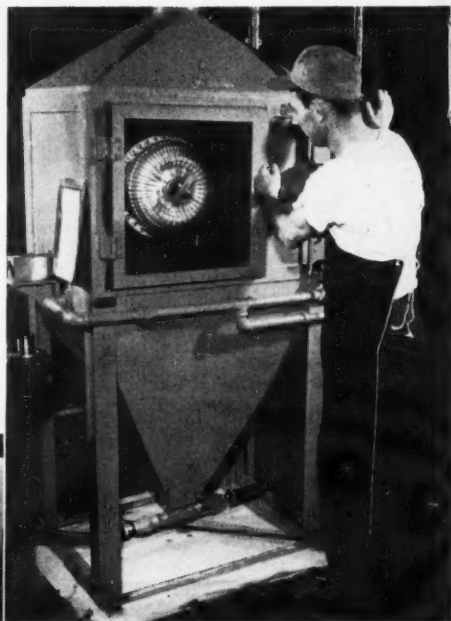
The operator shown here is operating special Ex-cell-O 4-station facing machine which is designed to finish face both ends of the transmission case.





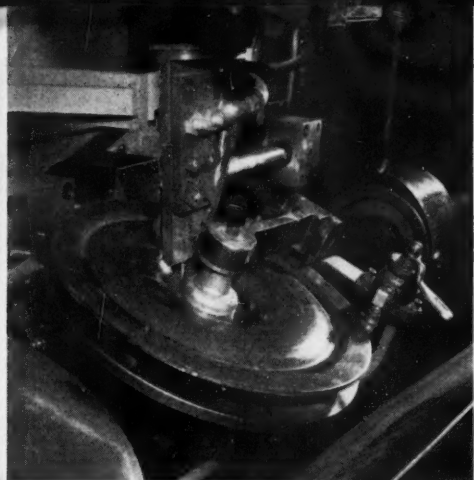
(Above) A view showing the three main parts of the transmission converter assembly. The part at the left is a turbine assembly. The part in the center is an impeller housing and stator assembly. The part at the right is the converter cover, and starter ring gear assembly.

(Right) Transmission converter impeller housings are deburred in the machine shown here.



(Left) Impeller housings are bored, grooved, and drilled in the 4-station specially designed machine shown here.





(Left) View showing the manner in which a small pilot hob is welded to a converter cover. The operation is performed in an automatic progressive welding unit.



(Right) Illustration showing method of testing automatic transmission cover pilot assemblies for oil leaks in specially designed water bath.



(Right) A view showing one of the few hand operations required in the manufacture of the automatic transmission. This operation is the welding of steel shrouds to the converter stator.

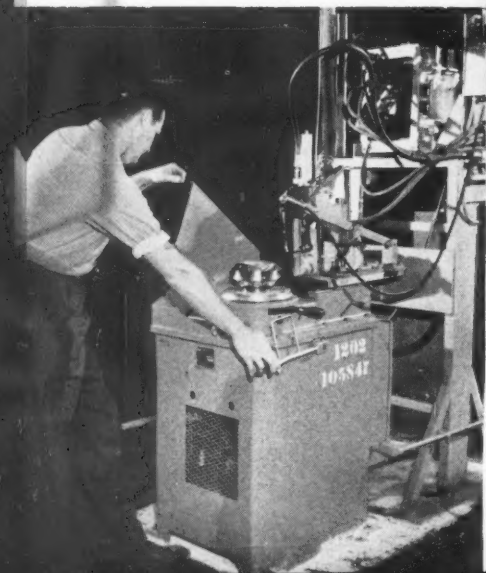


(Left) Finish machining the outer radii and propeller shaped surfaces on the transmission converter stators in a close tolerance machine tool.

(Right) The machine tool shown here is designed for broaching the inside diameter and keyways of transmission converter stators.



(Left) Transmission converter stators are balanced on the specially designed machine shown here.

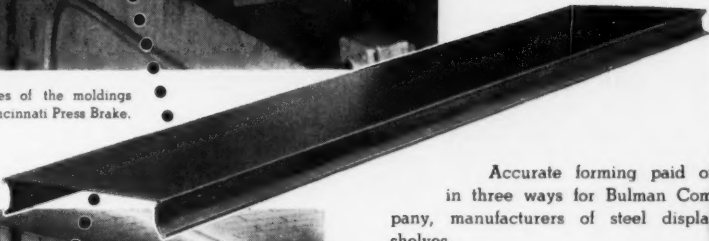




accurate forming

**on a Cincinnati
solved this
problem**

Note the clean, straight lines of the moldings formed on the shelf by this Cincinnati Press Brake.




Accurate forming paid off in three ways for Bulman Company, manufacturers of steel display shelves.

Trouble had been experienced in maintaining regularity of product. Now the clean, straight line formed from end to end of the shelving permits a perfect match-up of sections, eliminating a costly trim piece.

Better product, with no discards, and one piece completely eliminated, were the results when this Cincinnati Press Brake was installed . . . it was a profitable investment.

Write for Catalog B-2A—a Cincinnati Press Brake may improve your product and reduce your costs.

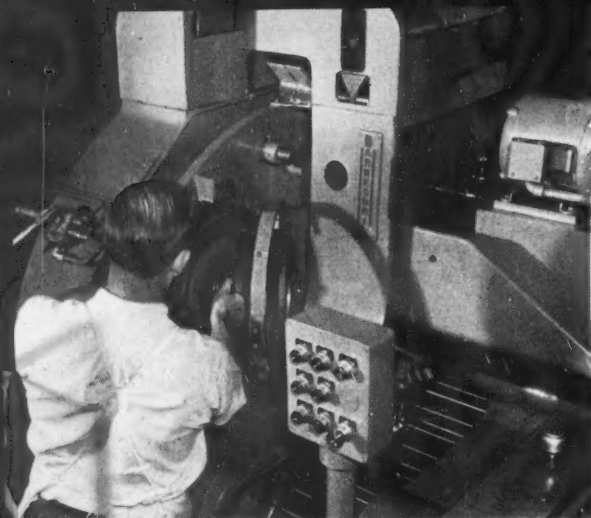


These outstanding sectional Bulman display shelves fit accurately.
Photo courtesy E. O. Bulman Mfg. Co., Inc., Grand Rapids 2, Michigan.

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO U.S.A.
SHAPERS - SHEARS - BRAKES





The operator is shown removing a transmission converter cover from a multiple spindle drilling machine which is designed to drill a total of 17 holes.



The quenching unit shown here is designed to shrink the transmission ring gear onto the converter assembly.



Starting ring gears are faced and bored in the machine shown here.

When it
comes to production—
come to
Hartford Special

Automatic Thread Roller

ROLLS 120 to 150 PCS. PER MIN.

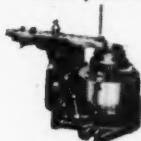
Completely Automatic Feed
Filtered Lubrication
Table Top Working Level
Vibration Free Operation
Quick, Easy Set-ups
Class 3 Fits

diam. from .086" to .190"
thread lengths from 1/4" to 1 1/2"

WRITE FOR BULLETIN NOW!



Hartford Special also makes
these production machines



SUPER-SPACERS



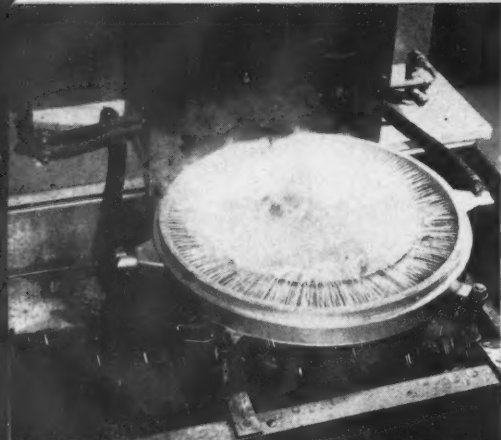
AUTOMATIC DRILLING
& TAPPING MACHINES



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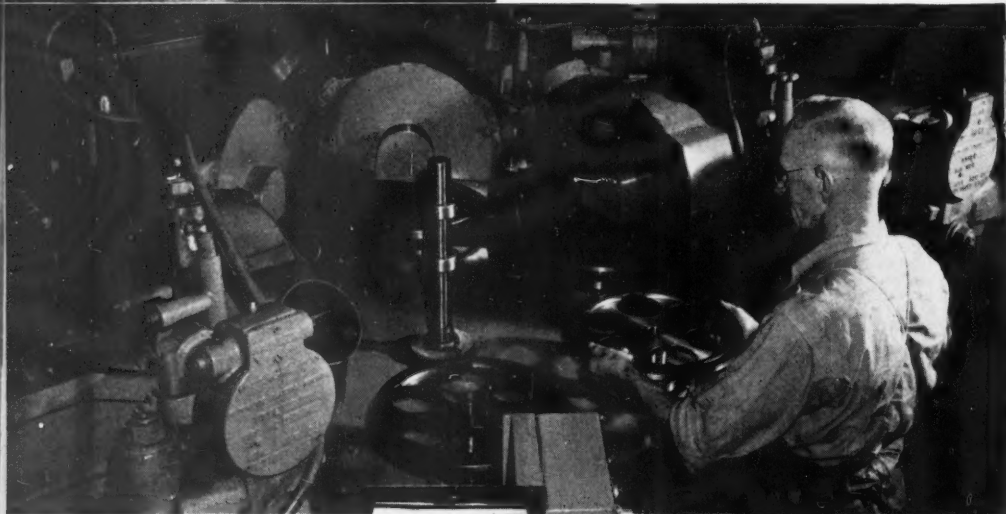
HARTFORD
Special

THE HARTFORD SPECIAL MACHINERY CO.
HARTFORD 13, CONNECTICUT

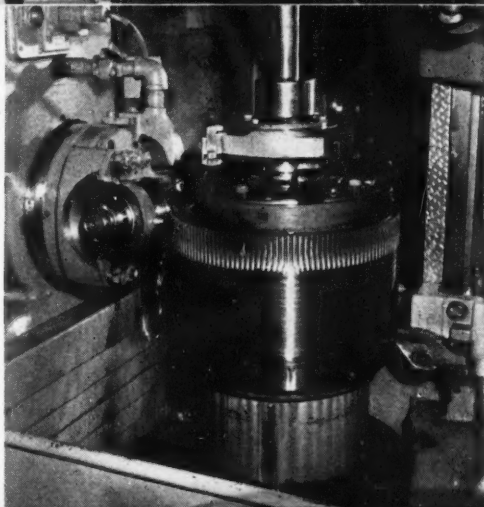


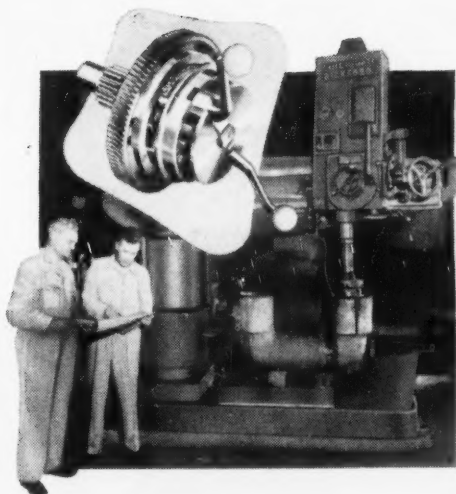
(Left) Teeth of the starter ring gear are heat treated in the induction heating unit shown here.

(Below) The operator is shown placing a transmission ring gear in a specially designed brushing machine. In this operation burrs from the hobbed gear teeth are removed.



(Right) Close-up view of the hobbing operation. The 146 teeth in the transmission starter ring gear are finish machined in this single spindle hobbing machine.





At the Wheland Company, Chattanooga, Tennessee, this 6' arm 19" diameter column SUPER SERVICE Radial is boring 11-1/8" diameter holes out to a finished size of 11-3/4" diameter in cast steel pump parts, holding an accuracy of plus or minus .001"

11 3/4" in CAST STEEL

Heavy work is being performed with absolute safety on Cincinnati Bickford SUPER SERVICE drilling machines, with extreme ease of operation. Unlike any other, the SUPER SERVICE clutch is a sturdy positive tooth type. It has a large diameter hardened steel ring, with saw tooth serrations on the inner circumference, into which two opposed serrated hardened steel segments are snapped instantly by touching either one of the twin quick return levers. This requires only finger tip effort.

The feed is driven by the spindle through a safety feed gear. This is a patented exclusive feature of the SUPER SERVICE Radial and guarantees protection of this mechanism for the life of the machine, against damage due to over-load.

Write for further information about our complete line of Upright and Radial metal drilling machines.

*Equal Efficiency of Every Unit
Makes the Balanced Machine*

THE CINCINNATI BICKFORD TOOL CO. Cincinnati 9, Ohio U.S.A.



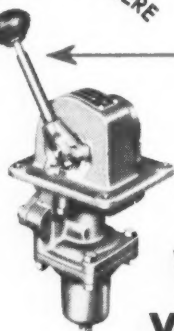
Got any Problems That Call for

**THROTTLING
GRADUATING
POSITIONING**

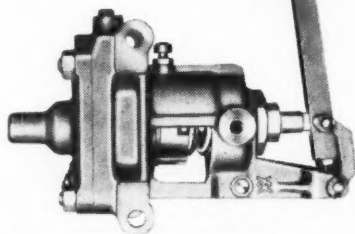
CONTROLS?

Here's your Answer...

EACH MOVE HERE

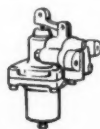


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**W.A.B.
VALVES and ACTUATORS**

The smallest move of the control-valve handle is "echoed" by proportional movement of the actuator to throttle engines, graduate flow in process operations, positioning actuator to modulate fuel feed to boilers, etc. Eliminates complication and maintenance of mechanical linkage. Only connection is an air tube. Place controls at any distance from operation, centralize command of multiple operations. Hand, foot and cam operated valves available. Ask for Bulletin IDA 9481-1.



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AIR BRAKE COMPANY
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An ABC Demonstration of

Inspection of 9 pieces using conventional plug gage
Bore Diam. 1.500"; Total Tolerance .001"



4 pieces passed



4 pieces too small



1 piece
too large

DuBo
Plug Gage
Superiority

RESULTS of same inspection using DuBo Plug Gage



Of the 4 pieces passed by conventional plug gage above, only 3 are actually within specified limits when inspected with the more sensitive DuBo plug gage.

DuBo reveals piece D (passed above) is too large



Of the 4 rejected as too small by conventional plug gage, E and F are actually within the limit when inspected with DuBo plug gage.



I, rejected by conventional gage as too large, is so verified when inspected with DuBo plug gage.

Of nine pieces inspected, DuBo reclaimed two false rejects and rejected one piece that had been passed by ordinary plug gage inspection. Apply even a fraction of this ratio to a day's production in your own plant and you'll realize the advantage of using DuBo plug gages.

Don't Let Profits "Fly Out the Window"

You'll actually save money by using this modern plug gage instead of the out-moded cylindrical plug. DuBo keeps down that high cost of parts needlessly rejected or incorrectly passed. It's all in the design. DuBo plugs simply check better because of the spherical principle on which they are based.

Write or phone any questions you have on this vastly better checking device.

* U.S. and
Foreign
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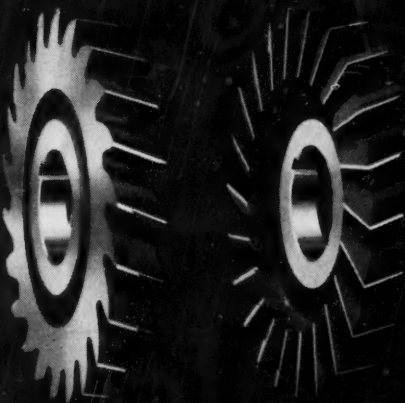
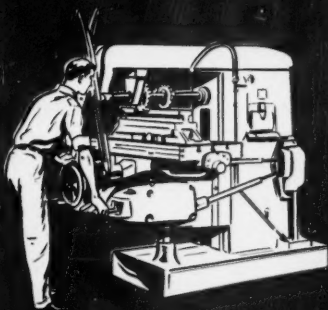
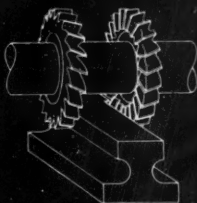
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Welding the Navy's Warplanes

Excellent equipment and facilities are provided at Sand Point Naval Air Station for testing all types of welding.

By HOWARD E. JACKSON

THE welding shop of the overhaul and repair department at Sand Point Naval Air Station, Seattle, Washington, is responsible for working on many types of aircraft, manufactured parts, jigs and fixtures. The department is located in a huge hanger-like structure between the machine shop on one side and the sheet metal section on the other. Thus, material and parts flow to the welding shop from two sides, often passing through it from one or the other of the flanking areas. An example would be a jig made in the ma-

chine shop, and destined for use on a punch press in the sheet metal section, but first stopping en route to be welded before being used for production work.

Many types of welding are performed on both new and used material or parts. Let's look a little closer at spot welding. This method of welding starts with cleaning procedures which conform to the Air Force-Navy "Specs". The materials used in welding include aluminum, chrome molybdenum, chrome nickel, magnesium, steel and stainless steel.

The surface of aluminum parts to be welded must be free from objectionable films such as oxides, scale, and other



Fig. 1—Welding begins with cleaning procedures which are governed by Air Force-Navy "Specs". Here is shown a part being immersed in caustic soda solution tank.

Fig. 2—Welding 0.051 24 ST aluminum test strip on 150 KVA spot welder. The test piece was taken off a five year old warplane.

substances detrimental to the welding process. Oxide coatings are removed by abrasive means, such as wire brush, steel wool, or by means of a suitable chemical treatment. This chemical or etching type of treatment is more or less according to standard practice. The work is first put in a Detrex degreaser for two minutes in order to remove any oil film. It is then immersed for about a half minute in a solution of caustic soda, as shown in Fig. 1, after which it is immediately rinsed in cold running water. After rinsing, it is immersed in a cold 50 per cent nitric acid solution to remove the dark smut deposited by the caustic solution and to neutralize any of the remaining alkali on the surface. The work is then rinsed in cold running water and dried.

An overhead crane with Comet motor is used for transporting material and parts about the plating shop where the washing is done. Due to the nature of the welding work many parts and pieces of material are hand-dipped. Where necessary, wheeled dollies or double-deck flat bed trucks are used for transporting the material to and from the welding shop. The double-deck type of truck provides for an increase in transportation efficiency of between 100 and 200 per cent. •

No two welding jobs that come into the shop are exactly alike and each time the machines must be set up to do the job. It is an axiom around the shop that any parts which are weldable are welded. However, no welding is done on stress parts. Some of the parts which are welded include cowlings, oil cool-



ers, heater ducts, fan housings, shrouds, ammunition boxes, and so on.

The spot welding section of the shop is equipped with the very latest water cooled spot welding units with ratings of 50 and 150 KVA. These spot welders are used for projection welding of steel plates, and for hot riveting, as well as for spot welding.

Many of the parts to be spot welded are work hardened, having been in or on the aircraft five to eight years. In order to qualify the spot welders, and to follow standard procedure, shear tests are made on sample workpieces. Strips of duplicate metal to be welded are prepared— $\frac{3}{4}$ inches wide, 4 inches long with $\frac{5}{8}$ inches overlap, and welded as shown in Fig. 2. The metal used in these shear tests is cleaned in the same manner as the material to be welded would be cleaned. Rockwell



Fig. 3—A test strip is tested in the Rockwell Hardness Tester, and the amount of hardness measured.

tions, insufficient penetration, excessive penetration and ultimate shear strength.

One of the interesting jobs performed in the welding shop, as shown in Fig. 5, consists of spot welding a small, $\frac{1}{4}$ inch wide, right angle shaped flange to a piece of $\frac{1}{2}$ inch tubing. The flange is Dural 52 S, of a size which permits hardly enough margin for welding. A special rod of tip material was made to fit into one end of the tubing for

hardness testing equipment, as shown in Fig. 3 is used for testing the hardness of the welded test piece, after which it is tested for strength in the tensile testing unit shown in Fig. 4.

A visual inspection is made of the test pieces, checking carefully for heat cracks, indentations and diameter of weld. Quality standards are high . . . probably as high as in any shop in the country. In appearance the surfaces of all spot welds must be smooth, free of tip pick-up, pits, defects which indicate dirty electrode or an improperly prepared surface, or that undue penetration of the weld nugget, or diffusion of copper, has taken place. Similar high standards pertain to: external defects, surface indentation, penetration and internal defects, fusion between sec-

fit into one end of the tubing for



Fig. 4—A test strip is tested for tensile strength, with results being read on the gauge at the top of the tester. Note tester is actuated by variable speed $\frac{1}{2}$ h.p. motor, with forward and reverse, instead of manually-operated crank.

use as the lower electrode. The electrode was bolted to a 3 x ¼ inch copper plate which, in turn, was bolted to the lower arm of the machine by a clamp of the same material. A micarda block was used as a holder for the lower electrode, the block being ground out to the ½ inch radius of the tubing, to withstand the pressure and still take the weld.

It is interesting to note that the "O and R" department made a unique tool related to spot welding. As shown in Fig. 6, it is a micrometer stop counter sink that was modified to be used as a spot weld remover. The round housing shell over the bit end of the sink was ground down so that the bit could get into close corners in removing spot welds. The bit itself was ground down to give a flat cut. The depth of cut can be predetermined by adjusting the micrometer setting. The spot weld can be cut out of the top plate without cutting through to the lower plate.

The fusion division of the welding shop is provided with various pieces of arc and gas welding equipment, including a Westinghouse stabilized, 200 amps, machine for heliarc, and a Hobart and General Electric, each 250 amps, arc welders; and three sets of oxygen-hydrogen-acetylene setups for gas welding. As in the spot welding division there is a variety of work to be welded, from stair steps to landing gears to exhaust stacks.

This division is provided with its own sheet metal section, as shown in Fig. 7, with shears, brake, saws, and so on. The metalsmiths form, stamp, or shape the parts to be welded. These workers must make their own jigs and fitting to do the job. Each job is cleaned, as in resistance welding, according to specifications, by means of immersion in a

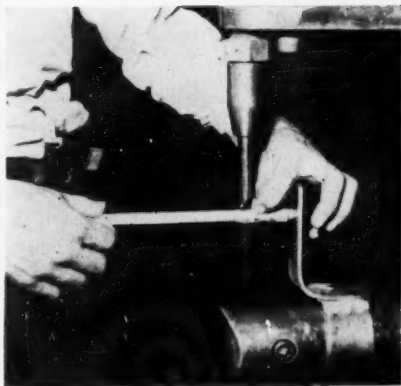


Fig. 5—Small pointer held in operator's left hand had to be spot welded to tubing in right hand. Lower electrode is inside tubing, held in place by clamp-like fitting. Micarda block below tubing supports electrode.

pickling solution, or by putting the part through the degreaser cleaning routine.

In this part of the welding shop a wire straightening machine is used for straightening welding rods, and cutting them off to length as they are fed through the machine from a spool of welding wire. A ¼ h.p. motor attached to a pulley drive actuates an offset piece of steel tubing supported on either end by ball bearings. The curved wire from the spool is pushed through the tubing which revolves at 1750 RPM, and the action straightens out the wire. A wire shearing device then cuts the straightened wire to required length.

Fig. 6—Micrometer stop counter sink that was modified for use as a spot weld remover.





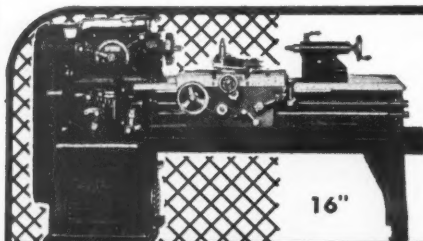
Fig. 7—Parts are taken directly from the sheet metal section for welding. The welders fabricate their own jigs and fixtures to do the job.

A noteworthy use of heliarc was the welding of an aluminum tank which is used in the instrument shop for stripping radium off instruments. A piece of plywood was placed over the opening in the tank so that little oxygen could get into the tank. Then the tank was filled with helium gas, and heliarc welded. The result was a smooth, non-oxidized weld on the back side, instead of the usual burnt appearance.

Welding, of course, is also performed via portable units and in other hangers throughout the well equipped

Naval Air Station but the most concentrated work is done in the welding department, in the "O and R" building. Welding plays a most prominent part in keeping the airplanes flying.

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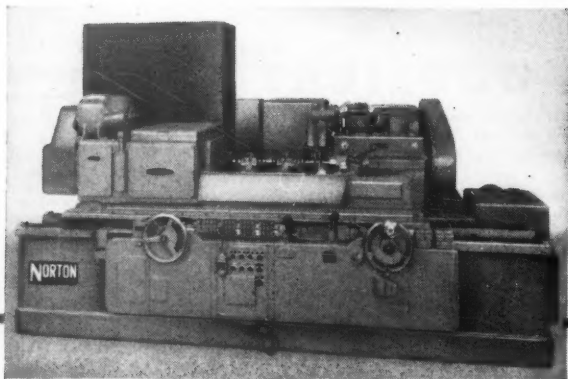
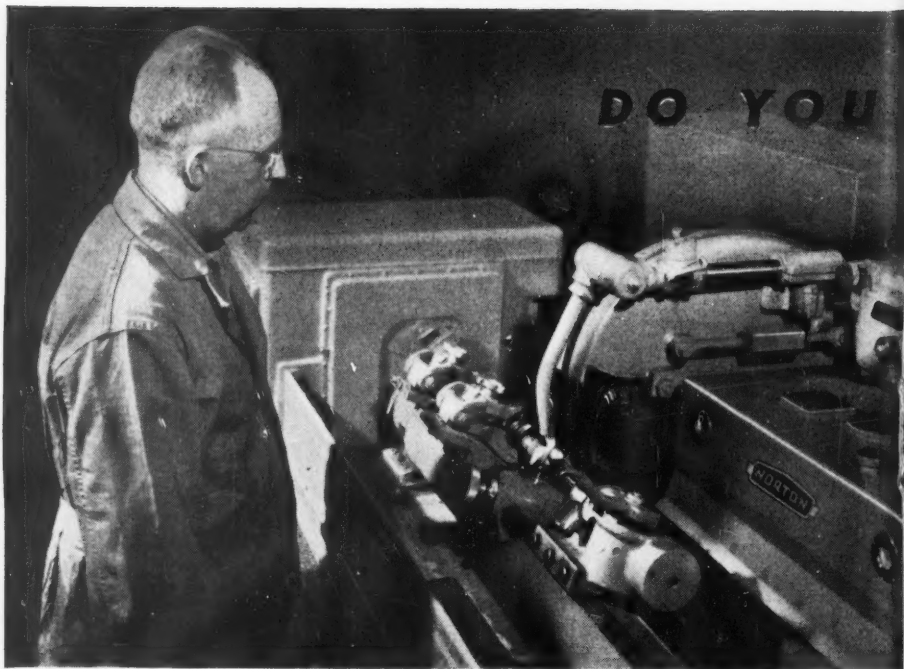
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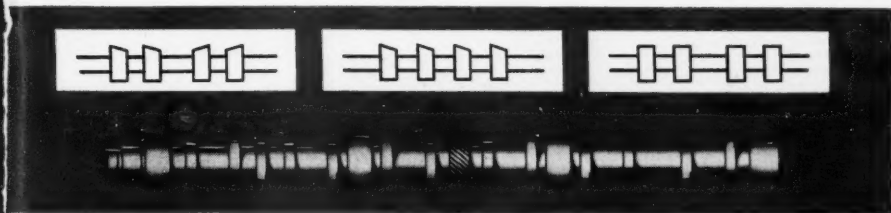
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Production Operations On Buda Diesel Truck Engines, Part II

By J. BROBERG

Assistant Factory Manager, The Buda Company, Harvey, Illinois

THE illustration Figure 13 shows the operation of drilling the stud holes in the tops and all holes in the front and rear of the cylinder block. The machine is a Natco three-way drill, using air-

operated clamps. The machine is entirely automatic; that is, a lever controls the air clamping and unclamping, and a lever controls the simultaneous feeding in and withdrawal of the three drilling heads.

The tapping of all the holes in the top and one side of the crankcase, for which a Natco two-way tapper is used, is shown in Figure 14. In this operation, also, an oil level gage hole is drilled and reamed at an angle by means of an auxiliary Leland-Gifford drilling unit. The Leland-Gifford unit is

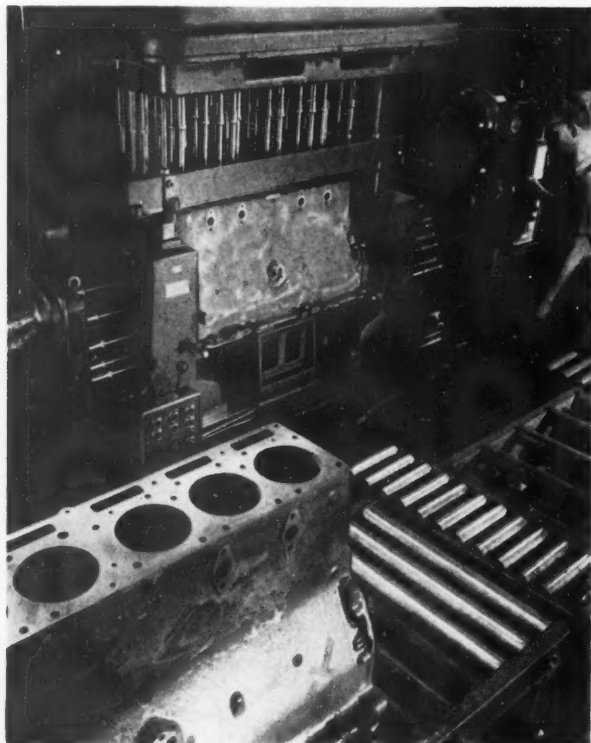


Fig. 13 — Using Natco Three - Way Multiple Drilling Machine to Drill All Holes in Top, Front and Rear Sides of Cylinder Block. Machine is Entirely Automatic

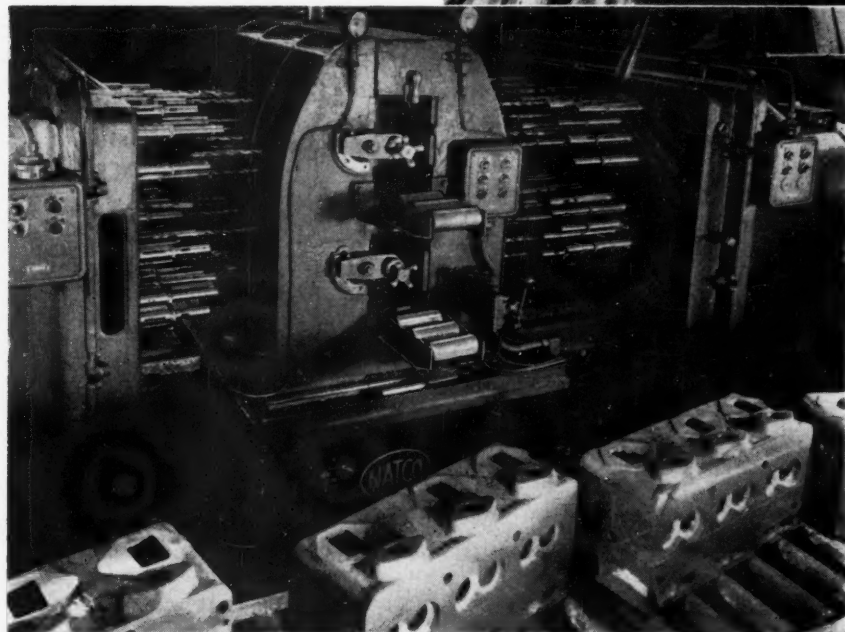
Fig. 14—Tapping Holes in Top and Side of Crankcase. Angle Hole is Drilled and Reamed with Auxiliary Unit

mounted on the side of the tapping machine in such position that it can be used to drill the gage hole in the proper position and at the correct angle.

All holes in the tops and bottoms of the cylinder heads are drilled in the two-way Natco multiple drilling machine shown in Figure 15. The machine is equipped with a double-deck fixture, which is necessary because the holes in the head are so close together that it is a practical impossibility to drill all the holes in one setting. Accordingly,



Fig. 15—Using Multiple Drilling Machine Equipped with Double-Deck Fixture for Drilling Tops and Bottoms of Cylinder Heads



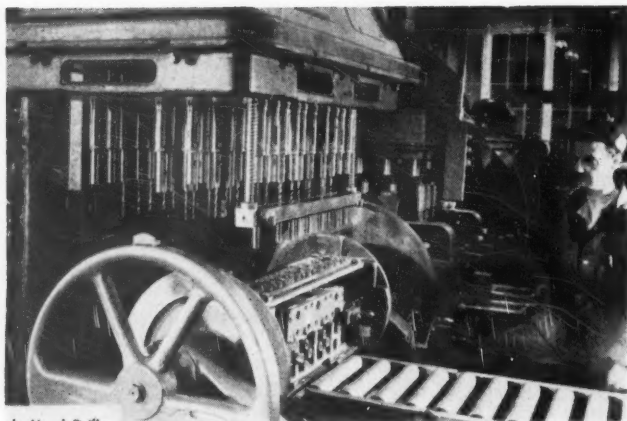
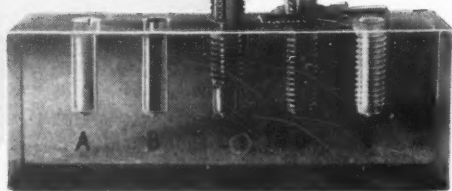


Fig. 16—All Holes in Both Sides of Cylinder Heads are Drilled in This Machine

the cylinder head is first clamped in the upper position and half the holes are drilled, then it is moved into the lower position and reclamped, and the remaining holes are drilled; thus one head is completed in each operation of

the machine.
To move the heads into the machine and out again, and move them from the upper to the lower level in the fixture, a section of the roller conveyor is mounted on a hydraulic lift in such manner that not only can this section be revolved at right angles to the main conveyor line in order to connect it with the rollers on the fixture, but also so that it can easily be raised and lowered to move the heads in and out

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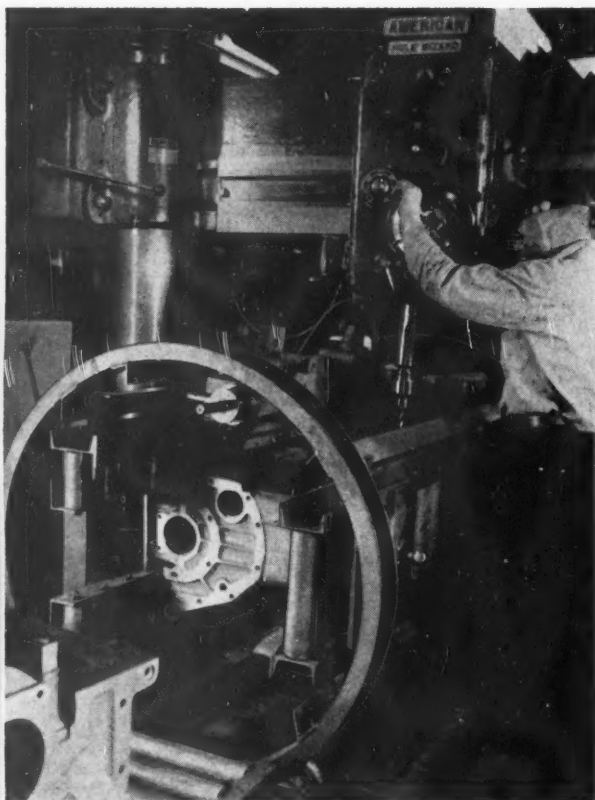


Fig. 17—Dowel Holes in Crankcase are Drilled and Reamed with this Radial Drill, using a Turntable-Type Fixture

of either the upper or lower level of the fixture as may be required. The section is revolved easily by hand, and is controlled hydraulically by means of a

lever in the hydraulic system. The gages shown on the machine register the amount of power required in the drilling operation; thus as the drills become dull from use, the gages indicate the increase in the amount of power required. When this increase reaches a given point, the drills are exchanged for sharp ones.

All holes in both sides of the cylinder head are drilled in the Natco vertical multiple drilling machine shown in Figure 16. This machine is equipped



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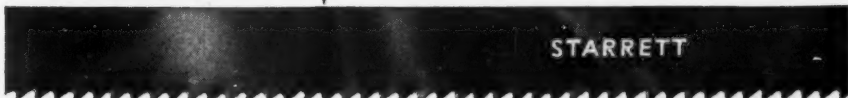
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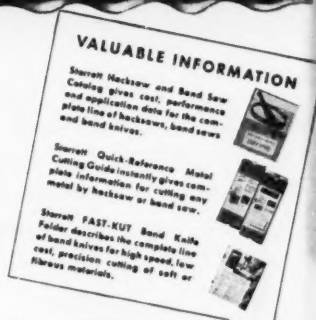
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drills are used to drill the head in four different planes, one plane being at an angle of 12 degrees from the square of the faces. This operation is not com-

operator to revolve the workpiece to the correct position for drilling. The drill templet is dropped into place on the side of the crankcase, locating the

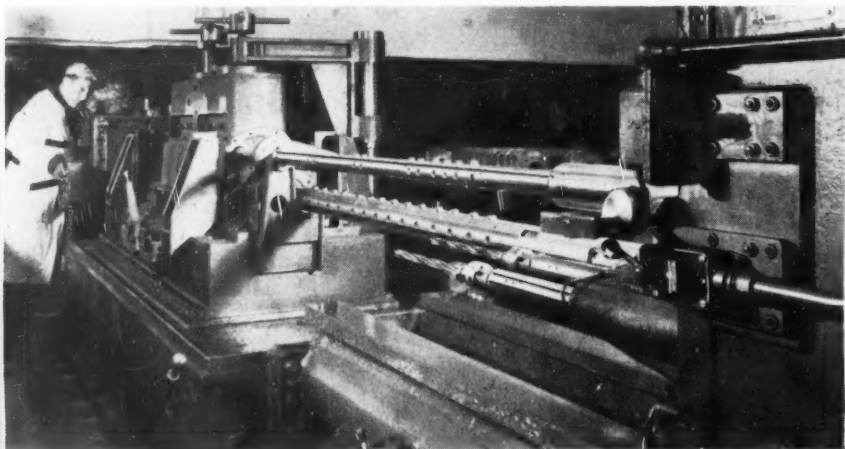


Fig. 18—Cam and Crank Bearing Holes are Finish-Bored with This Special Natco Two-Way Boring Machine, Equipped with Davis Bars

pletely automatic, inasmuch as the operator must revolve the fixture by means of the handwheel for the 12 degree angle.

The radial drilling machine shown in Figure 17 is used to finish ream the dowel holes for valve lifter bracket mountings in the crankcase. A turntable-type fixture is used to enable the

templet from the camshaft bore.

In this operation the operator finish reams the dowel holes for valve lifter bracket mountings, drills two holes in the oil filter pad, and drills, reams and taps an oil pressure relief valve hole. Note that the brackets to which the crankcase is bolted in the jig provide sufficient clearance for the bearing caps



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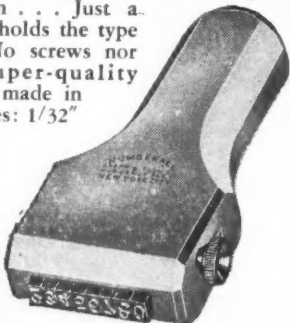
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on the bottom of the crankcase.

The equipment shown in Figure 18 is used to finish bore the cam and crank bearing holes in the crankcase, finish ream the dowel holes for the front and rear housings and finish ream the dowel holes for the rear bearing oil seat housing in the flywheel housing. The

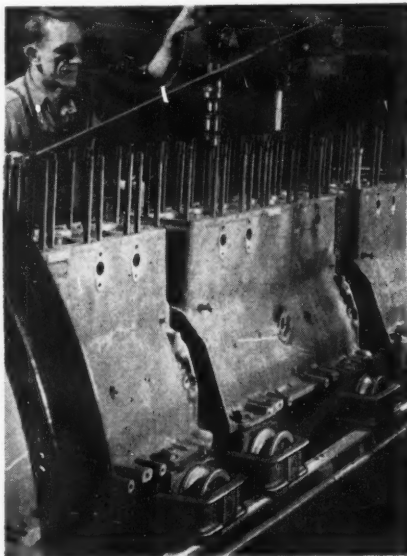


Fig. 19—Note "Ears" Cast on Side of Crankcase to Which Conveyor Wheel Housings can be Bolted

machine is a Natco special two-way boring machine equipped with Davis bars in which supermicrometer blocks are mounted.

The bar for boring the crankshaft hole carries 18 toolbits and the bar for boring the camshaft hole carries 14 toolbits. With this equipment the crankshaft bearing holes are bored in such perfect alignment that they will permit the entrance of an aligning bar which is only 0.0007 inch under the low limit of the bore. All gear centers



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Fig. 20—Use of Conveyor Tracks of Round Steel Shafting Provides for Swinging Crankcase to Most Convenient Angle for Assembling Pistons and Connecting Rods

are held to within 0.001 inch of the drawing dimension.

Up to a given point in the line, the crankcases move from one operation to another on a roller conveyor. From that point on, wheel housings carrying roller bearing-equipped flanged wheels are bolted to the crankcases so that the cases can be moved on tracks which consist of round steel bars. For this

purpose, two "ears" are cast on each side of the crankcase to which the wheel housings can be bolted, as shown in Figure 19. This method of conveying the cases was developed to provide flexibility for assembly operations.

In Figure 18 the operator is shown using a Black & Decker sliding arm equipped with a Thor pneumatic self-opening stud driver to drive the cylinder head studs in the crankcase.

The flexibility afforded by the use of flanged wheels riding on round steel tracks is illustrated in Figure 20. At this point a double bar is used in a roll-over fixture which is part of the con-

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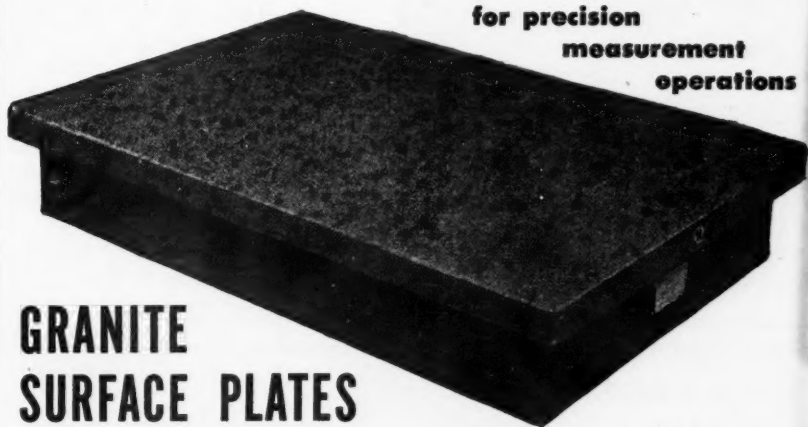
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Fig. 21—Track Section is Mounted on Turntable Base to Facilitate Assembling of Parts

crankcase tightly in position regardless of the angle to which it is revolved.

In this illustration the operator at the right is inserting the assembled pistons and connecting rods and the operator at the left is bolting the rods to the crankshaft. When this operation is completed, the fixture is rolled back to its original position and the case is moved ahead on the conveyor tracks.

Another view of a flanged conveyor wheel riding on the steel shafting track is shown in Figure 21. At this point the track section is disconnected from the rest of the conveyor and is mounted on a turntable base so that the crankcase can be turned to any angle necessary in a horizontal plane to facilitate the assembling of the camshaft and other parts to the engine.

veyor system so that the crankcase can be tipped to the angle most convenient for assembling the connecting rods and pistons. The double track—one under the wheel, the other over it—holds the

Figure 22 is a view of the engine assembly line. This line is not confined to the assembling of one type of engine; engines designed for gasoline, for butane gas, and for fuel oil are all assembled on this line. Such workman-

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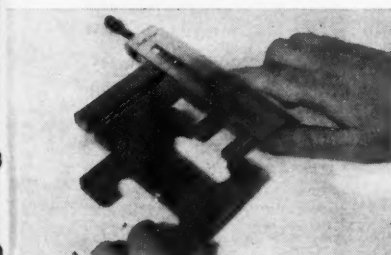
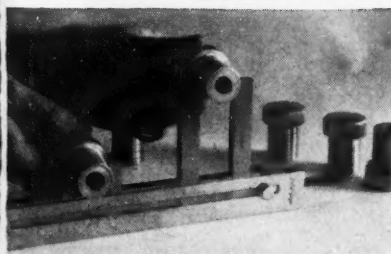
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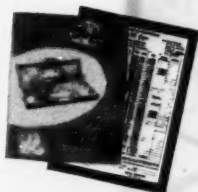


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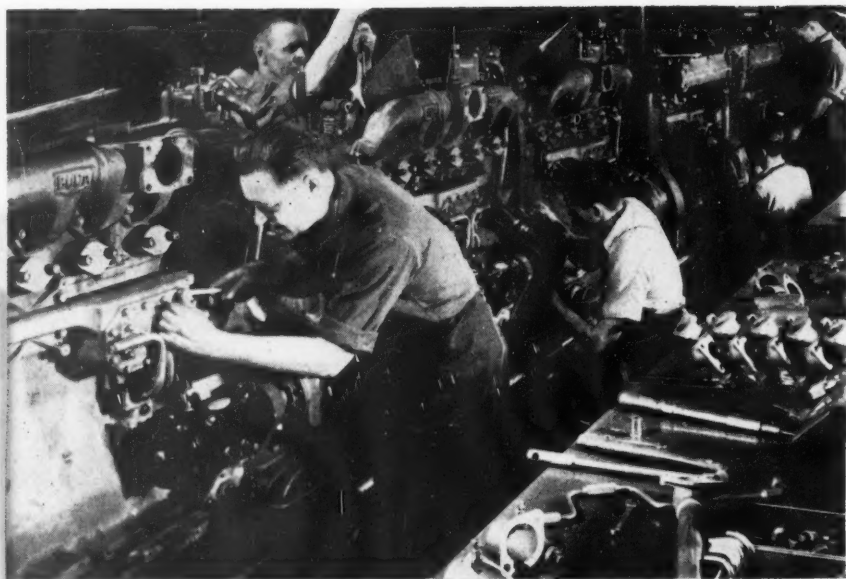


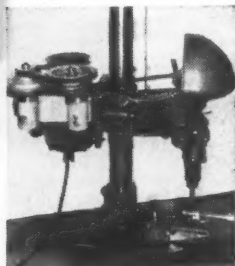
Fig. 22—General View of Engine Assembly Line

ship requires highly trained and experienced mechanics, of which The Buda Company maintains an adequate supply.

The illustration Figure 23 shows an assembly line for building a different type engine. The feature of this line is the moving stockroom, consisting of parts cabinets suspended from a monorail parallel to the assembly line and

just behind the workers. The cabinets make the complete circuit of the assembly line and back through the stockroom, into which they pass empty.

In the stockroom each cabinet is loaded with all the parts necessary for the assembling of one engine, except for the crankcase. The cabinets are then started on their way through the



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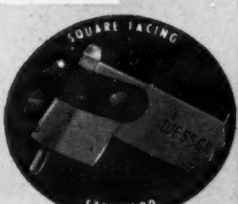
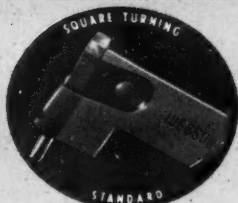
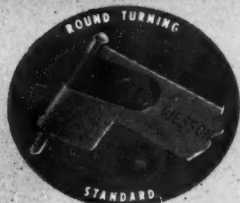
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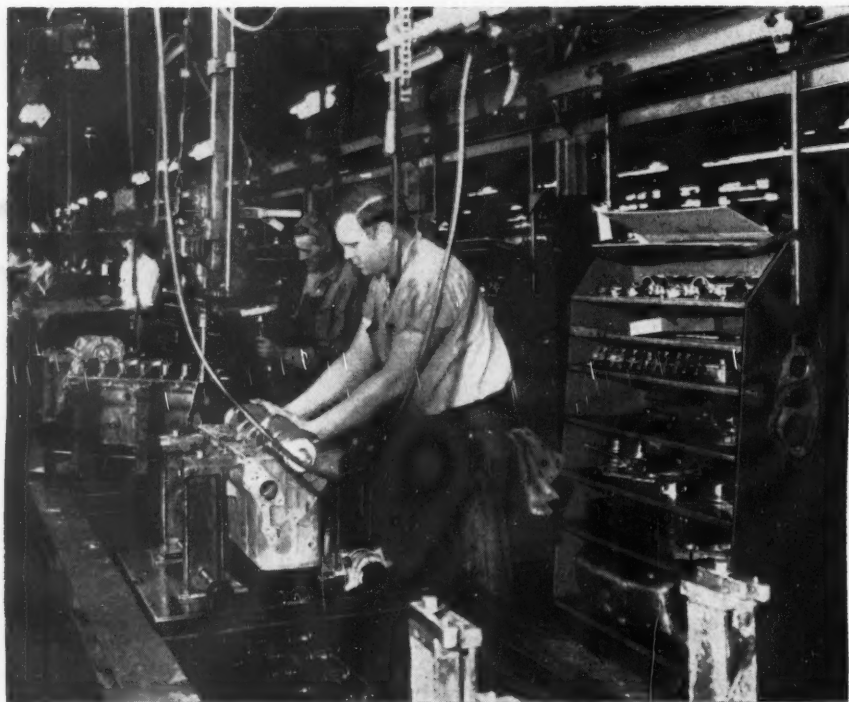
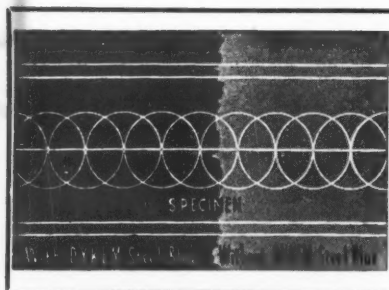


Fig. 23—Feature of This View is the Moving Stockroom, Suspended from Monorail.
Each Cabinet Contains Parts for One Engine

assembly department, each assembler in turn taking from the cabinet the parts required for his part of the assembly job. The engine mounting and the stock cabinet reach the end of the

line together, the engine completely assembled and the stock cabinet empty. This system eliminates the need for maintaining piles of stock at various places along the assembly line and pro-



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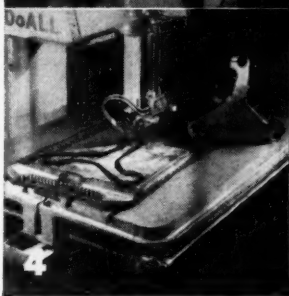
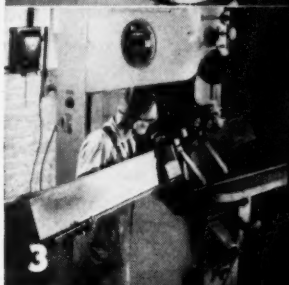
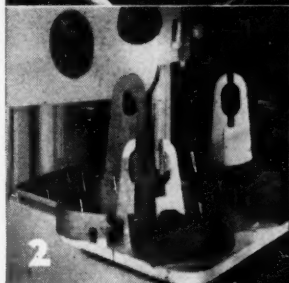
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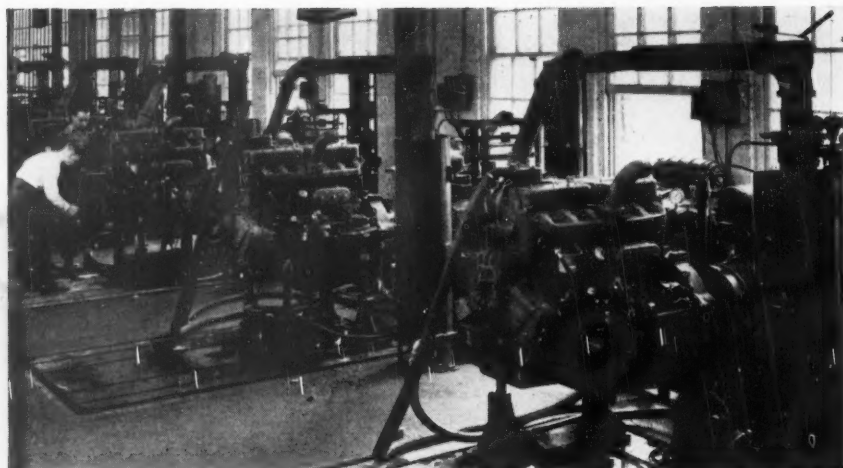


Fig. 24—Engine Test Room. Each Engine is Given a Thorough Work-Out Before Being Released for Service

vides for a complete accounting for all of the pieces necessary to the assembling of each engine.

Upon leaving the assembly department, each engine is set up on a test block in the test room, Figure 24, where it is given a thorough test before being released for assembly in the final unit. Fuel lines are hooked up to the engines to provide gasoline, butane gas or fuel oil, as the case may be, and each engine is connected to a dynamometer water feed and dynamometer water return, engine cooling water feed and cooling

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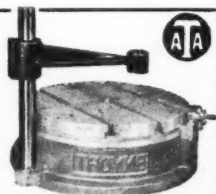
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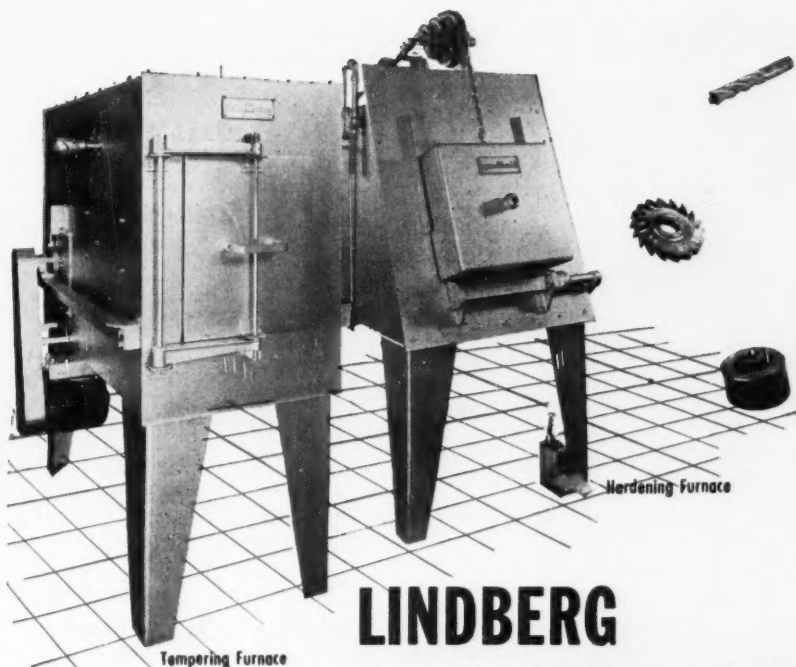
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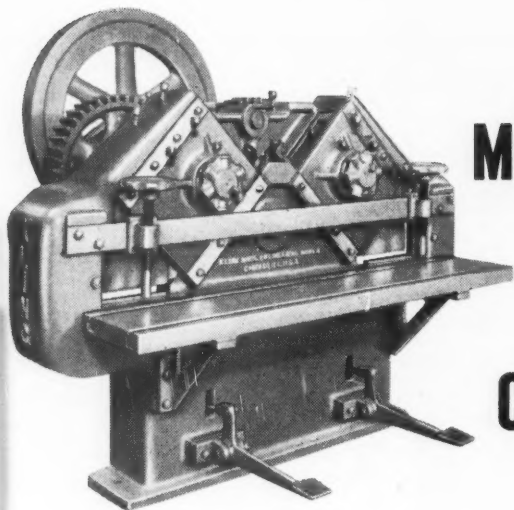
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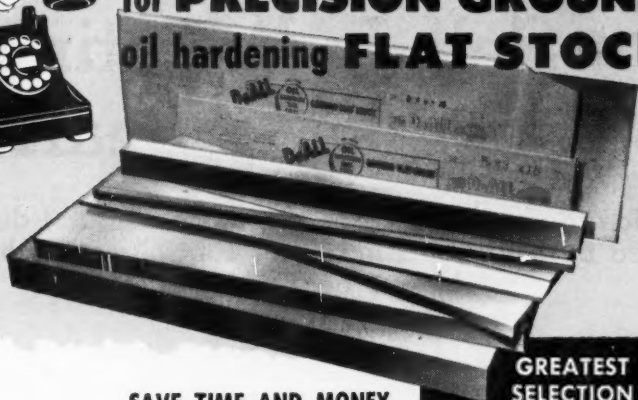
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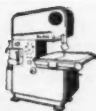
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Handling Precision, Self-Lubricating Bearings

In which the author describes the useful set of directions adopted by Northrop Aircraft for controlling the handling of bearings.

BY GILBERT C. CLOSE

OIL-IMPREGNATED, self-lubricating sintered bearings must be carefully stored and handled if they are to fulfill efficiently the operation for which they are intended. The method of handling becomes even more critical when these bearings must be machined prior to installation, or when a used bearing is to be re-installed for a second

or a third time.

To this end, and after considerable research, the Process Engineering Department at Northrop Aircraft, Inc., has issued a set of directions controlling the handling of such bearings in the Northrop shops. These directions are applicable in all shops where the utmost in bearing service and precision is desired.

Proper storage of the bearing until the time of its use is important. At Northrop, each bearing is placed in a



Fig. 1—Machining a sintered, self-lubricating bearing. Note ample width of cutting tool. No coolant is used during the operation as it would foul the pores in the bearing.

Fig. 2—Used, self-lubricating bearings prior to machining. Use-marks are evident on the outer bearing surfaces. Such marks result in sealing off of bearing pores, and should be machined away prior to re-lubricating and re-use.



grease - proof, water - proof bag or wrapping that effectively prevents the entry of dust, dirt or water vapor, and that in turn will not absorb the oil from the bearing. The material used for these bags or wrapping must conform to joint Army-Navy Specification JAN-B-121. After the bearing is properly wrapped, it is stored where low or very moderate ambient temperatures will predominate. This temperature must not exceed 90 degrees F. Higher temperatures will cause expansion of the bearing metal, thus exuding the oil from the pores.

When the bearings must be machined prior to installation, the following regulations prevail:

1. Only dead-sharp tungsten-carbide tool bits can be used.
2. A fast cutting speed (up to 350 fpm) must be employed.
3. Light finishing cuts (0.000 to 0.002 inch) must be used. Nose width of the tool must be broad enough to overlap the width of the feed per revolution.
4. No coolant shall be used.

Burnishing for sizing is recommended wherever possible, but reaming is permissible for sizing cuts of 0.001-inch to 0.003-inch provided the bearing does not become overheated. Sintered iron bearings (Super-Oilite or the equivalent) may be honed provided they are

cleaned and re-lubricated after honing. Honing of sintered bronze bearings is not permitted.

All sintered bearings must be relubricated just prior to installation or assembly in the part. New or unused bearings need not be solvent cleaned, and are relubricated by immersion for 15 minutes in a lubricating oil conforming to Specification MIL-O-6082, Grade 1065, heated to 140 degrees F. Used or machined bearings (not in housings) must be handled in the following manner:

1. If the bearing has been subjected to high heat for prolonged periods, or has been highly stressed or severely machined, the bearing must first be cleaned by immersion in clean Stoddard solvent for 30 minutes, followed by air drying in an oven at 150 degrees F. This hot drying effectively eliminates all cleaning agent from the bearing pores.

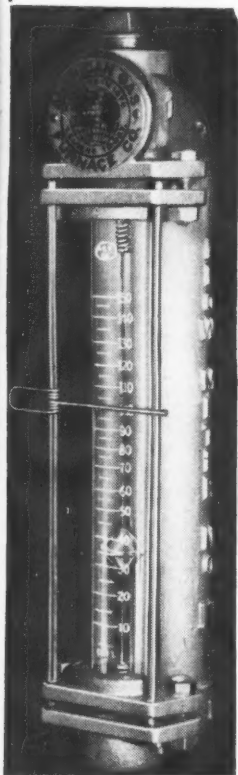
2. After cleaning, the bearing is dipped in a 50 per cent solution of Nitric Acid in water for approximately 30 seconds. Immediately after the acid dip, the bearing is thoroughly rinsed in hot water, or in a cleaner that will neutralize the acid. The bearing is then thoroughly dried at 150 degrees F. (Though some experience will be re-

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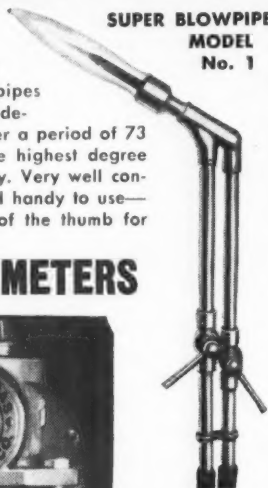
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quired with the acid dip, it is logical to assume as a starting point that approximately 0.0015 to 0.002 inch of material will be removed by the acid etch.)

3. The bearing is then relubricated by a 20-minute immersion in Grade 1065 oil heated to 200 degrees F.

4. All bearings must be removed from housings (if installed) prior to the above treatment.

It should be noted that the above handling methods retain or re-establish the precision and quality required for aircraft installation. These methods and procedures are approved by the U. S. Air Forces, and have been in effect in the Northrop shops long enough to firmly establish their service life values.

Illustrations Courtesy Northrop Aircraft, Inc.

"Building an American Industry" is the title of a 179-page cloth-bound book published by The Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland 14, Ohio, on the occasion of the 75th Anniversary of the company. An autobiography by Jacob Dolson Cox, Sr., this volume presents an interesting story of The Cleveland Twist Drill Company and its founder. Numerous illustrations are provided throughout the book, including several full color pictures.

The contents of the book are divided into five principal parts covering various stages in the life of Jacob Dolson Cox, Sr., from childhood to success as head of a thriving business. The last few pages of the book commemorate the 75th Anniversary of The Cleveland Twist Drill Company.

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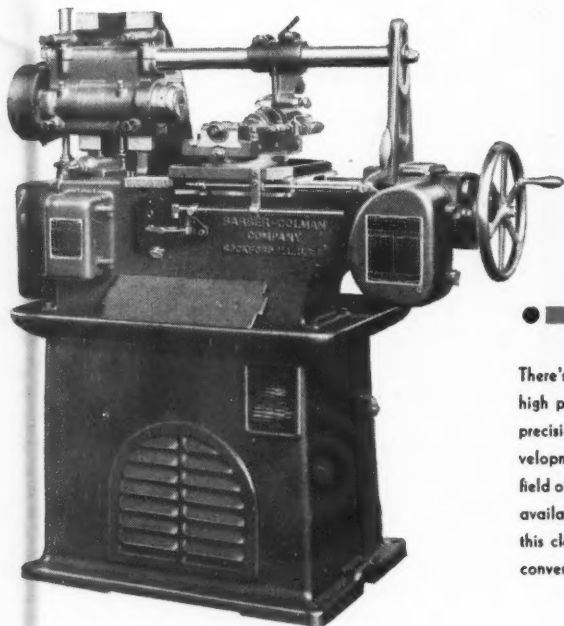


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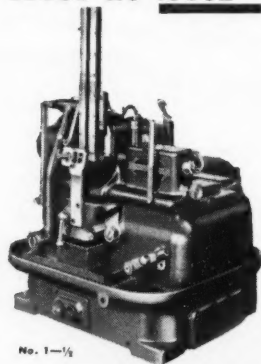
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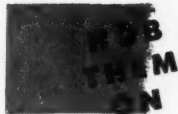
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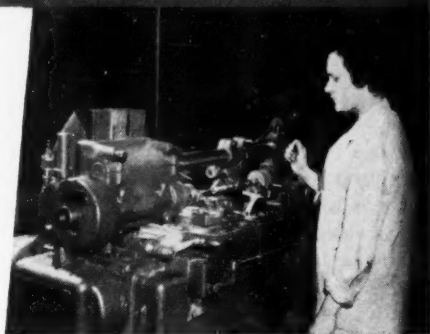
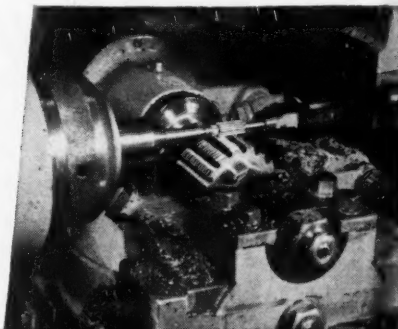
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This Barber-Colman finish-hobbing operation produces pinion teeth within .0002" adjacent tooth spacing limits, holding .0015" concentricity. Hobbing cost per pinion is negligible, with hobbing time of 5 seconds and hob life of 18,000 pinions per sharpening. One operator services a battery of six machines, loading and unloading with quick-acting center bracket. Here are the specifications: 7-Tooth pinion, .346" O.D., 3/4" face B1113 Steel. Hob — Barber-Colman, Ground, Topping, Multithread, 18,000 pinions per sharpening. Feed per rev. of work—.050", Hob Speed—533 rpm.

Instrument Manufacturer Hobs 3600 Gears per Hour ▶ 120 D.P., .0003" P.D. Runout, .0002" adjacent Tooth Spacing

Typical of a range of fine pitch gear work in the plant of a large precision instrument maker, this hobbing job requires a high degree of finish and accuracy on a high volume basis. A battery of three machines produces 3600 gears per hour. Close tolerances are consistently maintained at this rate of production. Fast loading and unloading is accomplished with air-operated tooling equipment. Here are the specifications: 50-Tooth Spur Gears, 120 D.P., .433" O.D., .031" face, Brass. Hob — 1-1/8 x 1 x 1/2", Ground, Multithread. Feed per revolution of work—.150", Hob Speed—183 rpm.

Send for a copy of Facts About Fine Pitch Hobs.



When you require small gears, in pitches as fine as 268 D.P. (200 D.P., Ground Hobs; 150 D.P., Carbide Tipped Hobs) in high volume and with close limits of tooth accuracy and concentricity, call your Barber-Colman representative for assistance. With the precision and engineering built into the hobs and machines, he can help you reduce such problems to ordinary gear cutting procedure.

Barber-Colman Company

GENERAL OFFICES AND PLANT, 155 ROCK STREET, ROCKFORD, ILLINOIS, U.S.A.

H O B S A N D M A C H I N E S S I N C E 1 9 1 1

August, 1951

MODERN MACHINE SHOP 135

Safe Lifting is Everybody's Business

An actual case history of the initiation of a safety program by a progressive management, concerned about the safety of its employees and interested in improving the efficiency of its material handling devices.

April 3, 1950

From: Safety Engineer

To: Works Manager

Subject: Chain Breakage

Two weeks ago, a near accident was reported: A chain, used with our yard swing crane broke, causing a drop of an 8,000-pound-load. Fortunately, the break occurred shortly after the lift was started and the load was dropped only a few inches. Needless to say, serious injury or even death could result from such a mishap.

Today, another near accident occurred in department 68. The ring of a chain sling broke causing a 5000-pound-load to drop, thereby barely missing a worker. Upon preliminary investigation I found that the workers had been observing all safety rules and that apparently the handling equipment was faulty.

I am asking herewith that all our sling chains be inspected by an expert and that the necessary repairs and replacements be made. Moreover, peri-

odic inspections and educational programs seem indicated. Will you please comment and also take the necessary steps to prevent recurrence of such serious accidents.

April 5, 1950

From: Works Manager

To: Safety Engineer

Subject: Chain Breakage

Reference: Your letter of April 3

I am indeed concerned to hear about the two near-accidents and I am asking, therefore, our plant engineer to do some research in order to set up a sound repair and inspection program. A copy of my letter to him is attached herewith.

April 5, 1950

From: Works Manager

To: Plant Engineer

Copies to: Safety Engineer

Subject: Chain repair and inspection program

Repeated failures of lifting equipment indicate that we must set up a strict, periodic inspection program for

all our chains and special lifting devices. Perhaps periodic annealing will prevent "work hardening" and subsequent failure of our chain slings and lift rings.

Please investigate all possibilities, perhaps question key-personnel of other larger local manufacturing plants as to their practices. Analyze these replies and make definite recommendations.

April 19, 1950

From: Plant Engineer

To: Works Manager

Copies to: Safety Engineer, Tool Engineer

Subject: Chain Program

To start on a sound basis for our program, I inspected the greater part of our chain slings. From my findings, I deducted that we cannot originate an annealing program for the following reasons:

1. Chains, rings and links purchased during the past few years are made of alloy steel (125,000 PSI) and must not be annealed, lest we lose a great percentage of the inherent tensile strength.

2. Many older chains made of wrought iron were fitted with alloy rings or hooks or parts of alloy chains and they, therefore cannot be annealed as one unit.

Wrought iron chains have little resistance to grain growth and subsequent brittleness. Only periodic annealing can correct this condition. Annealing, however, tends to lower the tensile strength and wrought iron chains should be rated down after each annealing. Alloy chains, however, do not "work harden" to any appreciable extent. These chains are heat treated and proof tested by the manufacturer. During the past ten years, we have

purchased only alloy steel chains and repair parts. Ignorant of some basic facts we have replaced worn or defective wrought iron parts with alloy steel parts. Rather than starting an annealing program, we can simplify



A "home-made" ring which failed under 5,000-lbs.-load. Failure was apparently due to omission of annealing operation after weld was made, causing hard regions. Hardness near break was found to be about Rockwell "C" of 55, which is much too high and represents vulnerability to shock loads.

our setup by elimination of wrought iron chains and parts. You will find more about this in my summary and recommendations.

I have contacted four of the larger local manufacturers and here is what I learned:

Mr. X, the plant engineer in charge of moving, maintenance and all handling equipment of "A" Corporation said: "We have had plenty of trouble and several accidents until we decided to switch entirely to alloy steel chains. We now purchase these to our specifications and we give strict orders, that no home-made rings, links or hooks are to be made or used. Repairs are also made on the outside. A definite improvement was noted; safety with re-

gard to chains is no problem anymore.

Mr. Y, safety director of "B" Company stressed the fact that no more wrought iron chains are being purchased. Old ones, however, are stress relieved periodically and inspected visually. No testing procedure has been set up to date but the subject has been discussed repeatedly and may be revived again soon. Reliance is put on a high safety factor of 5 and home-made repairs are not tolerated.

Mr. Z, of the "C" Corporation gave me information along the same lines. In addition, designs are being completed for a testing device for periodic non-destructive testing.

Mr. P, safety engineer of the "D" Company relates of a trained inspector, a specialist in chain inspection, who

makes weekly visual checks of all handling equipment.

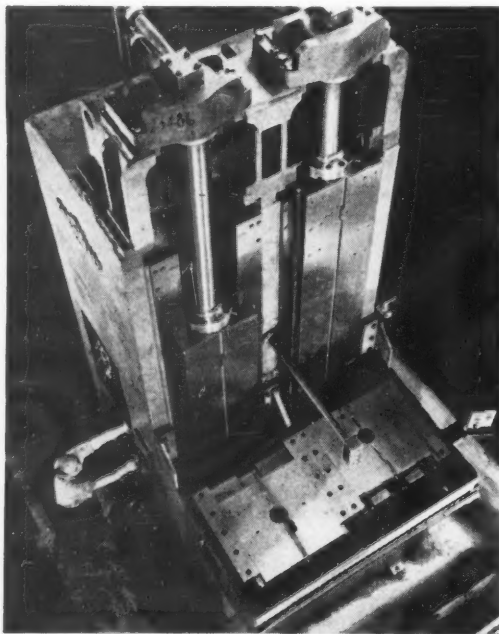
Analyzing these reports, the following facts are outstanding:

1. Only alloy chains are being purchased for general lifting.
2. These chain sling are purchased complete to specifications.
3. No work is done on these chains by these companies, either in repair or in fitting.
4. No company is actually testing chains.

After thorough investigation of all factors involved, here is my summary with my recommendations:

1. Any inspection system must be based upon numbering and registration of our slings and special lifting equipment. A special form (See Form

Giant Vertical Surface Broaching Machine



TYPICAL of some of the giant new special machines currently being built to expedite the production of parts needed for the defense effort is this vertical surface broaching machine under construction at the Colonial Broach Co., Detroit 13, Mich. The overall height of 28½ feet makes this one of the largest vertical broaching machines ever built. The dual ram—capable of continuous automatic operation—has a 90-inch stroke for both ram sections, permitting completion of the particular operation for which it is intended in one stroke rather than requiring two separate operations and machines.



Enlarged cross section of the teeth of a typical Nicholson file.

The right teeth make a big difference

Proper design, even height, uniform sharpness and correct hardening of teeth are tremendously important in lengthening the life and increasing the efficiency of a file. They take on added significance as defense preparedness calls for production speed-ups, steel conservations and maximum tool wear.

Nicholson manufacture has always given uppermost thought to

these vital factors relating to the myriads of tiny "business ends" of one of industry's most indispensable hand tools.

Thus, it can be said that Nicholson and Black Diamond files "speak through their teeth." And what they say is, "Twelve perfect files in every dozen—made from top-quality file steel and 87 years' experience." Sold through industrial distributors.

HOW TO SELECT, USE AND CARE FOR The right file for the job is interestingly described in words and pictures in Nicholson's famous book, "FILE PHILOSOPHY." FREE. How many copies do you need? Write to—



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(In Canada, Port Hope, Ont.)



NICHOLSON
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NICHOLSON

A FILE FOR EVERY PURPOSE

Form I

SERIAL NO.	178
PURCHASED DATE.	May 3, 1950
PURCHASE ORDR NO.	11618
DEPT. USED	Fabricating
USAGE	general lifting
MANUFACTURER	The XYZ Chain Corporation
MANUFACTURERS NO.	33752
MATERIAL	Alloy Steel 125,000 PSI
CHAIN SIZE	3/8"
HOOKS	2 Slip hooks
COUPLING LINKS	4 welded
END RING	pear shaped
LENGTH	72"
CAPACITY (AS TAGGED)	9,300 at 45°
RECOMMENDED CHANGES AND REPAIRS (ORIGINAL INSPECTION)	None
PROOF TEST EACH LEG (OURS)	10,000
PROOF TEST (MANUFACTURER)	13,200
SKETCH <div style="text-align: center; border: 1px solid black; padding: 10px; margin-top: 10px;"> Standard 2-leg sling chain </div>	

I) was designed for this registration program, sample of which is attached. The back side of this form may be utilized for the periodic inspection. Experiments were made to find a strong, durable tag to be affixed to the chain for identification purposes. Brass and steel tags proved too weak; they bent and broke. An excellent solution was found in the rivet-type replacement link. A flat was ground onto the link and the required information was stamped onto the flat. I suggest that the following information be stamped onto the link:

Serial number	S103
Safe load limit	8000
Department	D68

2. A survey must be made to determine where repairs and replacements are needed.

3. All wrought iron chains should be scrapped and replaced by alloy steel chains.

4. It will be necessary to put a well qualified person in charge of this program. This person must have sufficient time to initiate the program as well as follow thru, educate foremen and hitches, originate load charts and



WHEN THE CHIPS ARE DOWN ...

... THAT'S WHEN YOU'LL WANT CIMCOOL® to step up production for defense deadlines. This revolutionary coolant covers 85% of all metal cutting operations and permits faster speeds, increases accuracy, helps increase tool life.

Cimcool does a better job because it combines friction reduction and cooling capacity in a degree never before attained by old-fashioned cutting fluids. It's longer lasting in machines, too. So Cimcool reduces down-time

and cuts labor costs for cleaning and changing.

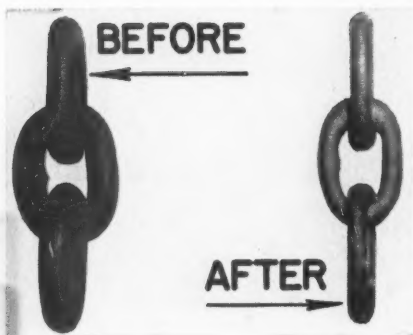
One week's run will convince you. For a demonstration in one of your own machines, just write us and we'll have one of our Cincinnati Milling-trained machinists call on you—without cost or obligation. Or, write for our free booklet "CIMCOOL Gives the Answers." Address, Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

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THE CINCINNATI MILLING
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for **85%**
OF ALL METAL CUTTING JOBS



A quick-thinking foreman removed the lift chain used in the shot blast room and compared it with a new chain. Two thirds of the lifting capacity was gone. Now, shot blast chains are inspected for wear much more frequently than others.

train and supervise the personnel connected with this program.

5. All standard chain slings should be purchased complete from a reput-

able chain manufacturer, who will also proof test them before shipment.

6. Even though it is desirable to have all chain repairs made by a manufacturer also, we should be able—and set up—to make repairs in our own shop. These repairs, as well as fitting of special hooks to chains must be made in strict accordance with a standard procedure (to be set up) and may be performed by special trained personnel only. No one else should be permitted to repair or alter any lifting device. The reasons for setting up our own repair service are as follows:

(a) There is no factory chain repair service in this city.

(b) We are using many special hooks which would have to be shipped back and forth to the factory, unless we can fasten these special hooks to the purchased chain slings in our own shop.



Three Electro-Mechano machines are used by pump manufacturer for drilling various holes in end plates, etc.

How to Drill Small Holes Fast and, With Precision

A prominent oil burner pump manufacturer has been using Electro-Mechano Drill presses for the past six years. His requirements are both precision and high production.

FOR HOLES FROM .004" TO .156" DIA. AT ANY ANGLE, IN ANY COMBINATION

These units can be placed at any angle and used in combinations for multiple hole drilling. Direct drive variable speed spindle provides speeds from 1000 to 10,000 or 2500 to 15,000 RPM.

AVAILABLE WITH AIR OR HAND FEED-VARIABLE SPINDLE SPEEDS

Shown at left is 8 inch hand feed model. Air feed model has hydraulic control.

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BULLETIN
MM-650.

THE ELECTRO-MECHANO CO.

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NEW DESIGN

PRODUCTO

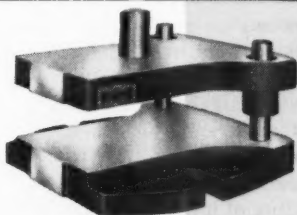
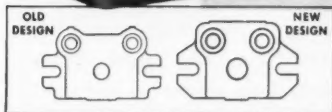
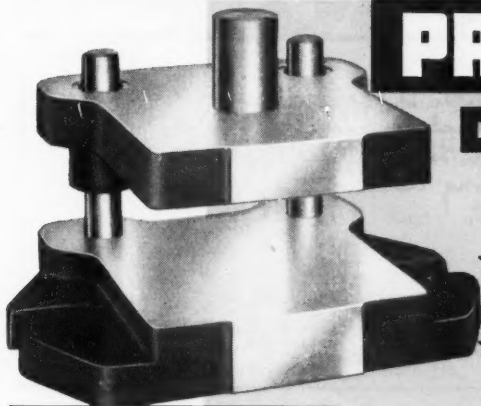
DIE SETS

FOR

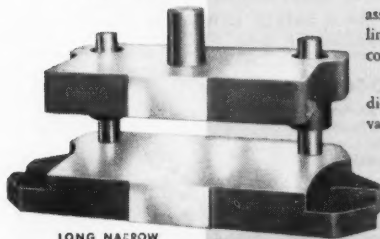
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★ HIGHEST ACCURACY

★ ATTRACTIVE STYLING



REVERSE



LONG NARROW

Buyers of the new Producto Catalog Die Sets now have the advantages of 6 major improvements . . . features that spell greater strength where maximum stresses occur . . . absolute uniformity of Sets . . . maximum accuracy.

Straight rear pad on new style die set allows considerably more layout and mounting area on the punch holder, as well as on the smaller die holders. New patterns produce clean castings with uniform grain structure and high tensile strength. Maximum strength is assured by careful designing — every contour planned to keep weight at a minimum while reinforcing all critical areas.

One long smoothly machined rear pad on punch and die holder assures uniformly accurate location of pin and bushing holes. Clean lines designed into new die set show tooling to advantage, make completed unit an instrument of precision.

All of these features are reflected on the cost sheets of tool and die makers — each means a saving in time, an increase in tooling value and a greater competitive advantage.

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ALSO MAKERS OF TOOL AND DIE ACCESSORIES, VISES, MACHINERY

Form II

SERIAL NO. <u>178</u>		TEST FREQUENCY <u>4x Year</u>	
DATE	PROOF TEST (LBS)	INSPECTION RECORD	INSPECTOR'S NAME
8/1/50	NONE	OK	C.M.
11/1/50	10,000	Ring distorted. To be replaced. Use new welded coupling links. each leg. Chain to be rated down due to soft coupling links. Changed tag to read 5,400 at 45°	C.M.
2/1/51	NONE	OK	C.M.

(c) Deliveries are rather slow in critical times.

(d) Emergency repairs are required occasionally and it would be economically unwise to keep a great number of spare chains on hand for such purposes.

7. I strongly recommend construction of a testing fixture to simplify periodic inspection. I am writing to our tool engineer for a preliminary design with cost estimates.

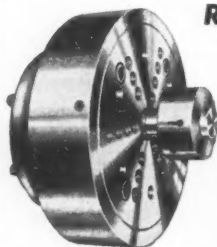
8. A periodic visual inspection program must be set up. For recording

such inspections, the back side of the registration form (See Form II) may be used.

An inspection should cover the following points:

- Twisted, bent or stretched links.
- Wear at bearing points.
- Nicks, gouges, deterioration.
- Distorted hooks or rings.
- Cracks.
- Overall stretch of the sling.
- Binding of individual links when chain is suspended freely.

9. As a safety program, periodic in-



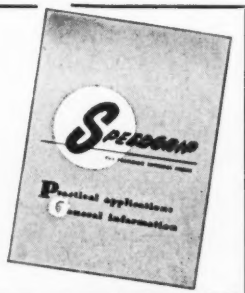
Revolutionary Processes

are always being developed. At first we are skeptical of them, but gradually we observe and consider their merits. Eventually we accept the benefits they have to offer.

So it was with SPEEDGRIP PRECISION INTERNAL CHUCKS. Today they are playing a leading role in leading industries of America. Send for your copy of the new SPEEDGRIP MANUAL today.

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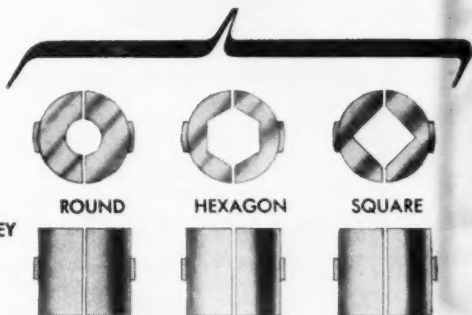
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**Master Feed Fingers
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Get better performance and savings with Hardinge Master Feed Fingers and low cost replaceable Pads . . . interchangeable among different makes of automatics with the same capacity . . . available for all sizes of the following machines up to and including 3 1/2" capacity:

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Form II

SERIAL NO. <u>178</u>		TEST FREQUENCY <u>4x Year</u>	
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8/1/50	NONE	OK	C.M.
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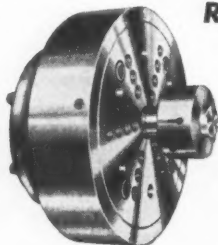
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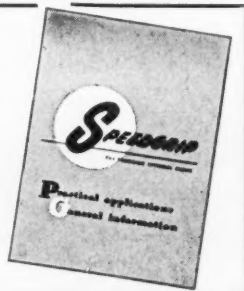
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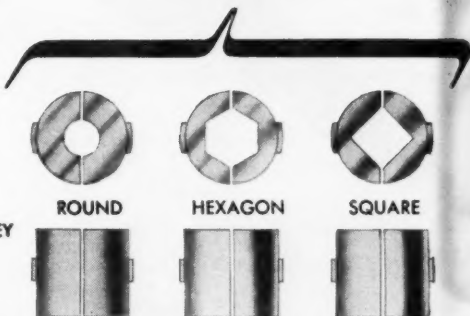


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Weight 12 ounces;
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chuck size ⅝ inch.
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specation and testing would not necessarily prevent accidents. It must be pointed out that an educational program is absolutely necessary to acquaint operators with the principle of lifting. It is interesting (and alarming) to note that the stress in the individual leg of a two-leg sling chain may be as low as 570 lbs. (assuming a load of 1000 lbs.) as long as the horizontal lifting angle approaches 90 degrees, while the same load may stress the same chain leg 7,700 lbs. at an angle of 5 degrees. Obviously, this is a good example of a danger point which cannot be overcome by inspection alone.

April 21, 1950

From: Works Manager

To: Plant Engineer

Copies to: Safety Engineer

I read your excellent report and recommendations on our chain program with great interest. This is to notify you that you will head this program and you may go ahead with each one of your recommendations with the exception of the testing fixture. The latter will be discussed after receipt of the tool engineer's proposal. Keep me informed as to the progress and completion of any phase of this program.

April 19, 1950

From: Plant Engineer

To: Tool Engineer

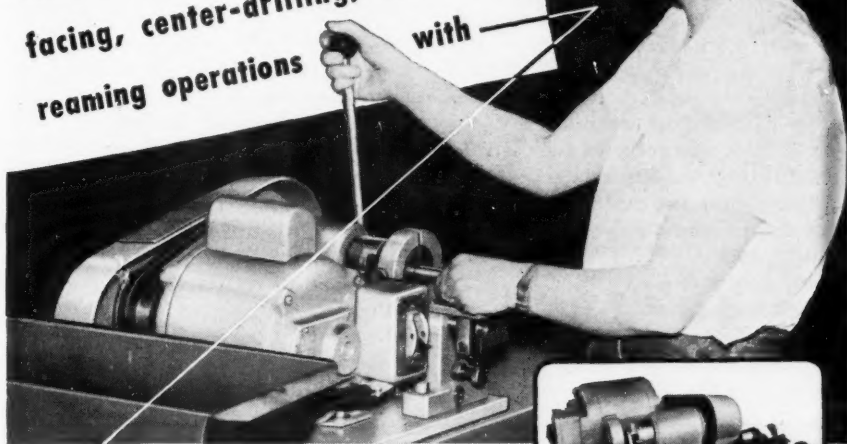
Copies to: Works Manager, Safety Engineer

Subject: Testing Fixture for periodic chain inspection

Attached to this is a copy of my report to our Works Manager concerning our new chain inspection program. This report will give you a good background to the assignment I am here-with giving you:

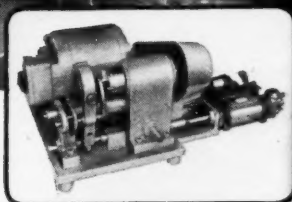
We will need a testing fixture to inspect sling chains. Will you please make your recommendations together

You can NOW speed
deburring, chamfering, pointing,
facing, center-drilling, and
reaming operations with

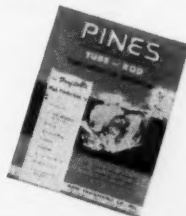


PINES END-FINISHING MACHINES

Handle broad range of rod, tube, and pipe end-finishing work with speed and precision. Exclusive chuck feature clamps and feeds work to cutters in one motion. Operator always has one hand free for stock handling. Designed with quick interchangeable tool holders and chuck inserts, 8-speed sheave — 760 to 3920 r.p.m., hardened and ground spindle, grease-sealed precision bearings. Automatic swing-type stock stop assures fast, accurate positioning. Entire unit is portable, takes up small space, handles stock diameters up to 2". Max. feed is 1/4". Larger sizes up to 5" capacity available. **Typical production: 800 tube ends per hour.**



(Above) Pines 2" High Production End-Finishing Machine equipped with foot-controlled air operating cylinder. Clamp, feed, and return cycle is automatic. Operator has both hands free for stock handling. Supplied similar to hand-operated unit.



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with approximate cost estimates. Firstly, you must know that we intend to purchase all standard chains complete. These will be proof tested by the manufacturer who also attaches a serial number tag. Periodic re-inspection of such purchased slings may or may not require non-destructive proof testing. However, for reasons listed in my report to the works manager, we will have our own repair station and I sincerely believe that we must test our own repairs, especially as they will be performed by welding.

Please study the problem and make your recommendations.

May 17, 1950

From: Tool Engineer

To: Plant Engineer

Subject: Chain Testing Fixture

Reference: Your letter of April 19

Analyzing the problem economically

I find two major possibilities for non-destructive testing of sling chains:

1. A large, adjustable testing fixture, approximately thirty feet long to take care of our longest chain. In addition, any test fixture would need:

1. Device for applying power and

2. Device for reading applied force.

I have checked with several leading manufacturers of test equipment and I was told that such devices exist but that their cost would exceed several thousands of dollars, "financially unsuited for maintenance purposes" as one manufacturer expressed himself. If we wanted to build such a fixture ourselves, we would use for power a hydraulic hand pump or an electrically driven hydraulic pump. We have one of the latter on hand (.116 G.P.M. and 10,000 P.S.I.), which is now used as a



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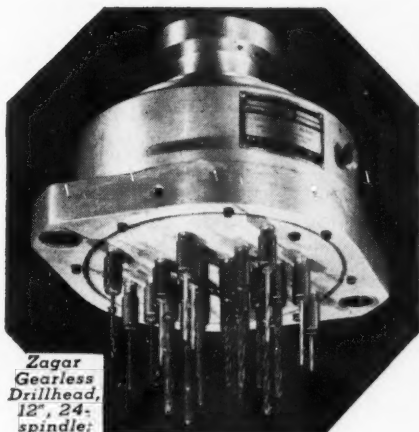
Chicago Mounted Wheels really cut—don't just rub. They provide a custom-built product to fulfill virtually every kind of grinding and polishing operation. They speed up production—last longer—and cost less . . . with a variety of styles and sizes to cover every type of operation.

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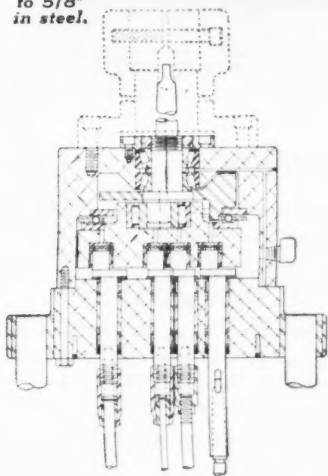
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Up with production! Down with man-hours! Forget those costly index fixtures! Let Zagar Gearless Drillheads drill your close-center holes, many hundreds of them at one "shot"—any number of spindles—any pattern—any material—as close as twice drill diameter. Zagar Gearless Drillheads are adaptable to any standard drill press or can be designed as complete units. Your part drawing will bring a prompt quotation.

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ANY PATTERN**

ZAGAR TOOL, INC.

24000 Lakeland Blvd., Cleveland 23, Ohio

Zagar

**TOOLS FOR INDUSTRY
and SPECIAL MACHINERY**

spare only and certainly could help out on our occasional chain inspection.

For reading equipment we could use:

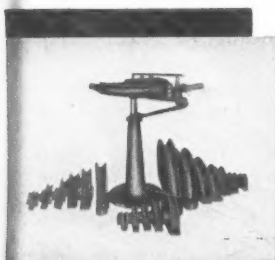
- (a) Dynamometers
- (b) Strain Gage Equipment
- (c) Hydraulic Gages.

The hydraulic gage is by far the cheapest, but it is not very accurate. However, to assure reliable readings, two gages should be available, one to be used, while the other is returned to the gage manufacturer for re-calibration. Strain Gage Equipment is highly accurate ($\frac{1}{2}\%$), but rather on the expensive side. Dynamometers, of which we have one on hand, are rather heavy and bulky and consequently not as convenient to use as a gage.

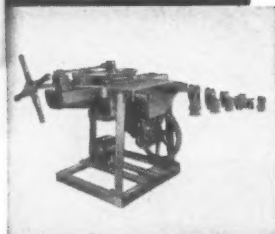
Figuring cost, I find that at least \$1,500.00 are needed for the construction of this thirty-foot fixture, using a twenty-ton hydraulic cylinder and

our own electro-hydraulic unit pump.

II. However, since we are going to purchase all standard slings which are proof tested by the manufacturer, you will only have to inspect these chains visually (as suggested by all major alloy steel chain manufacturers). Equally reliable is purchased alloy chain in random lengths. Therefore I suggest to build a small, upright testing fixture rather than the 30-foot-fixture. This fixture will be designed to test all welds of coupling links. Since these welds are performed in our own shop on special slings and on repairs, we certainly should test these welds. An upright fixture, utilizing the same hydraulic equipment as listed above, would cost us between \$300.00 and \$400.00, not counting the pump, as we can use our spare. Thirty hours design time should be added to these figures.



Hand-Powered
"American" A-30



Motor-Powered
"American" 2PB

bend pipe by hand or power with
"American"
cold pipe, conduit and heavy wall tube
BENDING MACHINES
Fast... Simple... Dependable...

RADIANT HEAT BENDS in Standard Pipe

Fast . . . Accurate . . . Average bend takes only 10 seconds!
Up to 180° bends . . . all sizes from $\frac{1}{2}$ " to 2". Usual radiant heat bends for $1\frac{1}{4}$ " at 6" and 9" radii can be supplied. Only 7 parts. Occupies 18" x 18" floor space.

Capacity $\frac{1}{2}$ " to 2" standard pipe . . . Minimum radius 5 times pipe diameter up to 180° . . . Maximum radius 13". Complete with rolls for each size pipe. Standard motor equipment 2 h.p.

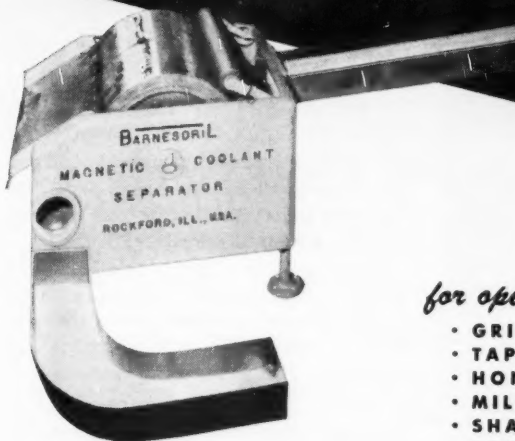
**Special radii supplied
on request.**

"American"
PIPE BENDING MACHINE
Company INC
Factory and Main Offices:
14 Furnace St., Poultney, Vt.

BARNESDRILL Magnetic Coolant Separators

ASSURE CLEAN COOLANT SUPPLY

for MORE PRODUCTION *from* EXISTING MAN-HOURS
and EQUIPMENT



for operations:

- GRINDING
- TAPPING
- HONING
- MILLING
- SHAVING
- BROACHING

Time needed now for cleaning machine coolant systems, frequent wheel dressings and tool sharpenings can be used for additional machine output, with the application of **BARNESDRILL** Magnetic Coolant Separators. Automatic removal by the separator of accumulated chips and swarf from the coolant supply keeps machines clean and running longer. Reduces maintenance and clean out; saves coolant and wheel or tool life.

Savings on a wide variety of production operations is described in our new series of Separator Data Sheets, S-51. Send for copies of these typical jobs or ask your **BARNESDRILL** representative to call and show you how you can get more output from your existing man-hours and equipment.

**BARNES DRILL CO.
ROCKFORD, ILLINOIS**

Please send me Data on Production Savings with **BARNESDRILL** Magnetic Coolant Separators:

For Machine, Model No..... Operation.....

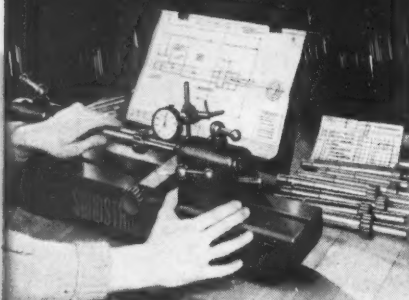
NAME..... DEPT.....

COMPANY.....

ADDRESS.....

CITY..... ZONE..... STATE.....

Keep a Close Check On Accuracy With SUNDSTRAND Bench Centers



Simplify assembly, lower spoilage and get better production from this modern Sundstrand Bench Center. You'll check work between centers easier, faster and within limits of .0001" on this improved Sundstrand Bench Center.

"One-hand control" over all movable elements leaves the operator's other hand free to control rotation of the part being checked. Either headstock or tailstock can be unclamped, positioned and locked in place with a single hand operating the top lever. Investigate this bench center today.

Complete Range as Follows:

6" x 18"	12" x 36"	12" x 60"
6" x 36"	12" x 48"	12" x 72"

FREE Additional Data

covering complete specifications and additional features is contained in this bulletin. Write for your copy. Ask for data sheet **611**.



SUNDSTRAND MACHINE TOOL CO.
2539 Eleventh Street, Rockford, Ill., U.S.A.

I am sure that you will find the second proposal an intelligent, practical solution to our problem, as the upright fixture will be inexpensive, it will not take up excessive floor space and it will test all welds to twice the rated load of each leg.

May 24, 1950

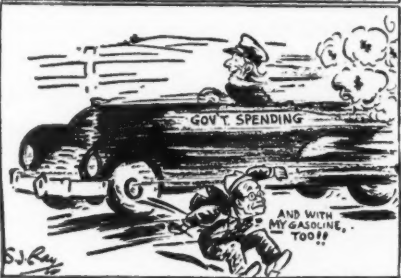
From: Plant Engineer

To: Tool Engineer

Copies to: Works Manager, Safety Engineer

I just received the "Go-ahead" from the works manager on your proposal No. II for a hydraulic chain weld testing fixture. Please go ahead with design and building of same just as soon as your schedule permits.

Editor's Note: The concluding part of this interesting case history in which will be shown an illustration of the hydraulic chain weld testing fixture will appear in the September issue.



— Ray, in The Kansas City Star

—and they call this inflation control!

Production Pointers from **GISHOLT**

TIME
SAVING
'DEAS



Why Gisholt's Recommendations Are Unbiased—In helping you solve your turning problems, Gisholt engineers have no reason to favor one type of machine over another except on the basis of its ability to best serve your needs. For Gisholt manufactures both manually operated turret lathes and automatic lathes.

C/F TURRET LATHE HANDLES AWKWARD PART

Face Plate Fixture Economical for Small Lots

The irregular shape of these bar feed bodies presents quite a chucking problem. That, combined with small lot production, means a real problem. We are solving this problem in our shop by putting the job on a 5L Saddle Type Turret Lathe.

A special face plate fixture is mounted on the face of the 32" Gisholt scroll chuck. This is counterweighted to permit using higher spindle speeds. The part is quickly bolted to the fixture for multiple boring, counterboring and facing operations. After the 1st operation part is removed, a

spacer added to the fixture, the part is turned over, and 2nd operation is performed. The cost of the fixture is more than made up by the rapid handling of the job.

C/F Turret Helps Simplify Job

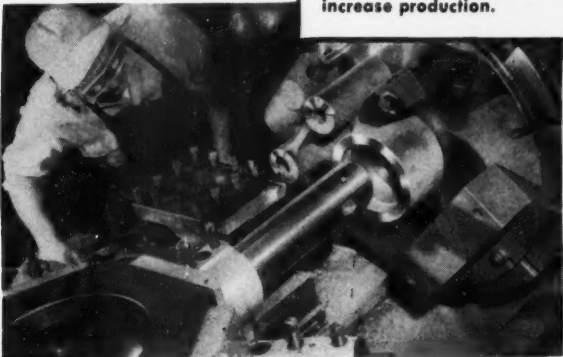
Turret tooling is at a minimum. A single tool bit in the square turret handles facing of the hub and intermittent facing cuts. A single boring bar in the cross feeding hexa-

gon turret handles the rough and finish cuts in the bore and counterbores. Thus, simplified tooling keeps down the investment and reduces setup time. The rigid construction of the machine permits simultaneous use of the square and hexagon turrets for further savings.

Simple tooling, plus simultaneous machining from both turrets and a counterweighted face plate, result in maximum efficiency.

Are You Missing a Bit?

Every "old-timer" in your shop knows the value of combined cuts on a turret lathe. But, many new men have not learned to save time by using the hexagon and square turrets at the same time. Watch for this in your shop . . . it will help you increase production.



This close-up shows how a smart setup can make a fast, easy job out of an otherwise slow and awkward one. Note the special counterweighted face plate.



Machined part after boring and facing the diameters and support bearing surfaces.

New literature describing the 5L Saddle Type Turret Lathe is now available.

FOR MORE PRODUCTION FROM

A GOOD WAY TO MACHINE PULLEYS

From Rough Casting to Finished 2-Step Pulley in 1.2 Minutes

Suppose you got a large order for pulleys like these. How would you handle the job?

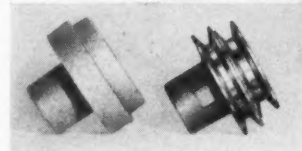
This manufacturer does it right... on a Gisholt No. 12 Hydraulic Automatic Lathe. The 5" parts are held in a 3-jaw air chuck. An air-operated tailstock supports the piece under heavy cuts.

On the front carriage is a special combination tool block with two turning tools mounted above the work and five grooving and facing tools at the side. The rear slide has a skiving tool mounted underneath the work and a form tool on centers. The cycle:

1. Front carriage feeds left and turns the 2 diameters with overhead tools.
2. Feed changes from longitudinal to cross feed, and lower tools rough out the grooves and straddle-face

This No. 12 Hydraulic with 5 sets of tools completes 2-step pulley every 1.2 minutes.

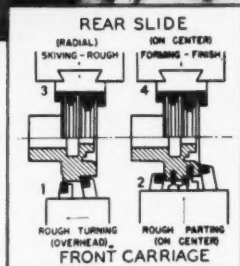
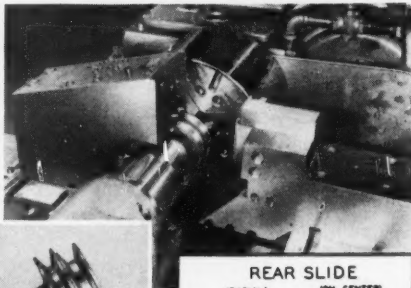
Rough casting and finished pulley.



both ends. 3. Rear slide brings in skiving tool to rough form grooves. Tools are below centerline and pass beyond after completing work. 4. Forming tools feed in on centerline to finish job.

Time: 1.2 min., floor to floor.

Multiple cuts with four sets of tools provide fast, automatic production at minimum cost.



Drawing shows 4 sets of tools that do entire pulley machining job.

DELICATE PARTS GET GENTLE TREATMENT FROM RAM TYPE TURRET LATHE

Special Tooling Simplifies Machining of Cream Separator Bowls

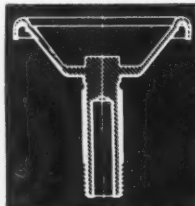
This Ram Type Turret Lathe has the tricky job of machining the tubular shaft and base for cream separator bowls.

Support for the long, rather weak stem is provided by a roller rest turner mounted on the hexagon turret. On the third turret face is an adjustable head with four tools for machining the bottom surfaces of the conical base.

Point Tool Generates Angle

The conical surface is nicely handled with a special angular mounted tool slide on the back of the square turret cross slide. Because this surface is too wide, and because the material is rather difficult to form or shave with a single

broad tool, this angle is generated with a single point tool at the same time the drill does the center hole. There is a pusher plate on the face of the drill holder which, as the hexagon turret advances, contacts the roller on the angular slide and pushes this to turn the cone at same time.

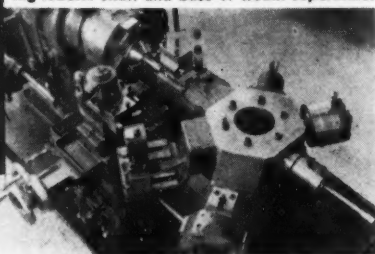


Heavy lines show the many machining operations on these parts for cream separators.

The square turret has a special multiple tool block with two tools to face the end of the stem and the flat surface at the base of the stem.

Special tools on the hexagon turret and square turret combine to achieve a maximum number of cuts with a minimum number of approaches to the work.

Tooling on Gisholt Ram Type Lathe for machining tubular shaft and base of cream separators.



MAN-HOURS AND MACHINES

TIME
SAVING
IDEAS



A SMART SETUP FOR HYDRAULIC VALVE BODIES

Minimum Changeover on Fastermatic

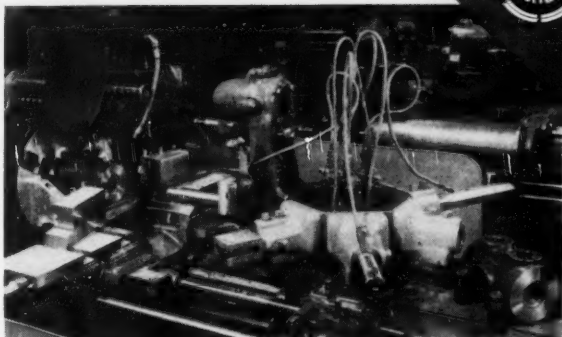
Perhaps you can use this idea: an automatic turret lathe set up to handle four different sizes of valve bodies, requiring such minor changes as spacers in the holding fixtures, individual drills, boring bars, etc. The machine is a Gisholt 1F Fastermatic.

The work itself is simple enough. It begins with a boring bar that sizes the cored hole—just deep enough to give the core drill a true start. The core drill is followed by counterboring, chamfering, finish boring and facing.

Tool Relief Provided

A conventional boring bar does the finish boring. When the cut is completed, a stop bar and cam move the entire bar toward the spindle centerline so it may be withdrawn without leaving a "snake track."

The tool blocks of the independent front and rear cross slides have adjustable slide tops and are fitted with T-slot mounting bases. The rear slide, which does the finish facing, is equipped with hydraulic tool relief. After the cut, the slide tips away.

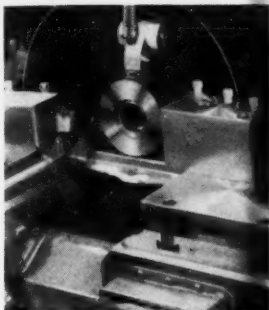


Fastermatic set up for finishing valve bodies. Note completed part on machine at right.

from the work several thousandths to permit the tool to clear the work as the slide is retracted.

All operations are performed automatically by the Fastermatic. It's the ideal way to handle such work—with one operator able to handle two or more machines. Catalog on request.

The Fastermatic handles a number of rough and finish cuts in one chucking and allows simple changes for difficult sizes—all with a standard automatic cycle and with tool relief where needed.



Close-up of rear slide equipped with hydraulic tool relief for clearing work after facing.

HERE'S THE RIGHT COMBINATION FOR FASTER FINISHING OF DIFFERENTIAL CARRIERS

Simplimatic Brings

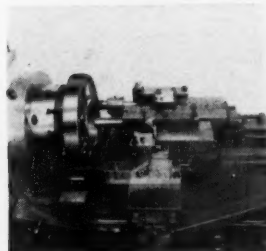
More Tools to Bear on Work

The photo shows second operations on a differential carrier—the kind of job that's a "natural" for this Simplimatic Automatic Lathe.

The wide platen accommodates individual tool slides with each slide feeding in the desired direction and at its own rate of feed. This permits each of the required number of cuts to be made in the most advantageous manner.

Operations are: turning the O.D., straddle facing both sides of the rim, facing and counterboring the hub, and at the same time, finishing the spherical bore in the center with a swinging tool actuated from the front tool slide.

The large platen table permits a choice of slide arrangements so each tool can work to best advantage. This makes it the equivalent of a "special" machine designed for high production work.



Tool slide arrangement for machining gear carriers.





TIME
SAVING
IDEAS

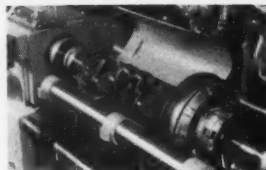
MEASURES AND CORRECTS UNBALANCE IN COMPLETE CRANKSHAFT ASSEMBLIES

Gisholt Balancer Combines Two Types of Correction Equipment

Here is the way crankshaft assemblies are balanced by one large automobile manufacturer. A type "S" Double End Drive Balancing Machine locates and measures dynamic unbalance in two parts of the assemblies—and then proceeds to make correction by two different methods.

When correction is made on the fluid coupling, weight is added to the light side by welding on a slug of the proper weight (as indicated by machine). Welding equipment is mounted on the back of the machine.

In correcting unbalance in the clutch, weight is removed



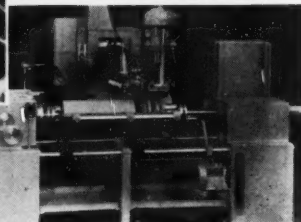
from the heavy side of the part. A drill press for this operation is also mounted on the balancing machine.

This machine illustrates again how Gisholt balancing equipment is adaptable for virtually every balancing problem. Booklet, *Balancing Machines*, has full information. Write for it.

With special correction equipment this machine locates, measures and corrects unbalance—all without removing workpiece.

Assembly ready for balancing.

Balancing Machine with welder and drill press for two methods of correction on crankshaft assemblies.



Gisholt Balancing School
Complete courses covering theory and practical applications of balancing. Get details. Type "S" course starts Sept. 10th.

SYNCHRO
BALANCERS



Available directly from
INTERNATIONAL MACHINING CORPORATION
Lynchburg, Va. 24502
See us at 1967 AMT
INTERNATIONAL MACHINING CORPORATION

SLITTER SAWS—BEFORE AND AFTER SUPERFINISHING!

Saw Blade Life Increased Six Times by Superfinishing

These two charts show the amazing difference in surface finish of slitter saw blades before and after Superfinishing.

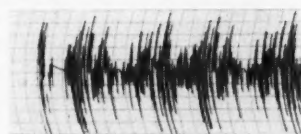
"Before" shows how the blades formerly were used in our shop. This way, however, the blades had a tendency to pick up material and bind. This galling shortened the useful life of the blade and caused rejects.

Now, all blades are Superfinished. From an average surface finish of 10 micro inches RMS, both sides are Superfinished down to 1 micro inch RMS. This results in six times longer blade life—offsetting many times the cost of Superfinishing. Binding is

greatly lessened. There's less scoring trouble.

This rather unusual use of Superfinishing shows the wide application of this modern process. Write for your copy of *Wear and Surface Finish*.

Superfinishing greatly extends the life of saw blades, reduces binding and scoring, pays real dividends.



These charts show before and after Superfinishing of saw blades. "Before" surface is approximately 10 micro inches RMS. "After" is 1 micro inch RMS.



Note lack of striations on Superfinished surface of top blade. Lower right shows blade not Superfinished and, lower left, what happens to this blade in service.

No. 851
375A



The Gisholt Round Table represents the collective experience of specialists in the machining, surface finishing and balancing of round and partly round parts. Your problems are welcomed here.

GISHOLT MACHINE COMPANY

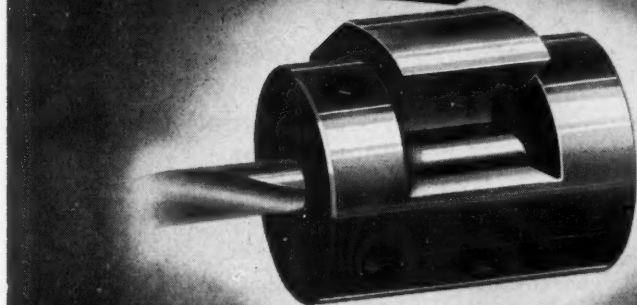
MADISON 10, WISCONSIN

A general catalog on machines listed below is available on request.

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

Barnaby HINGED-SHOE BUSHINGS

DELIVERED
PROMPTLY!



PROVIDE NEW SPEED and EASE OF SET-UP

Unlike conventional tool-holder bushings, Barnaby Hinged-Shoe Bushings have the clamping shoe fastened permanently to the bushing body by a hinge pin. Sufficient float is incorporated to assure uniform clamping pressure on the tool shank.

This hinged-shoe construction—available only in Barnaby bushings—offers the following practical advantages:

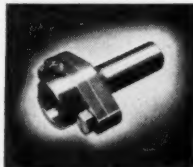
- Bothersome retaining rings and spring clips are eliminated.
- There is no possibility of the shoe becoming lost, or of using the wrong shoe in the bushing.
- No slipping of the bushing halves when clamped.

Thus Barnaby Hinged-Shoe Bushings permit faster, easier set-up wherever shoe-type bushings are required. They are available in $\frac{3}{8}$ ", $\frac{1}{2}$ " and

1" diameter for use on Brown & Sharpe automatics and similar machines, and can be furnished either blank or finished as desired. Their cost is trifling; the economies offered are great. Write today for full information.

Barnaby FLOATING HOLDERS

Using Hinged-Shoe Bushings, these all-steel precision Floating Holders permit rapid set-up and ready alignment of drills, reamers and similar tools. Available with shank diameters of $\frac{3}{8}$ ", $\frac{1}{2}$ " and 1" One Barnaby Hinged-Shoe Bushing blank is furnished with each Floating Holder.



Illustrated bulletin gives full details on Barnaby Hinged-Shoe Bushings, Floating Holders and other tools for screw machines. May we send you a copy?

Barnaby

MANUFACTURING CO., INC.
70 KNOWLTON ST., BRIDGEPORT 8, CONN.



C. W. Hinman

Designing Drawing And Redrawing Dies

In which the author discusses recommended practice for drawing 18-8 stainless steel.

By C. W. HINMAN
Designing Engineer

FOR a long time, drawing operations on 18-8 stainless steel have been considered among the most difficult, but now a considerable amount of data has been obtained which shows that this type of steel need not cause more trouble than any of the other types of steel if a few simple precautionary steps are taken. As to lubricants for use on dies in which stainless steel parts are drawn, special lubricants have been made available by a number of well-known manufacturers of lubricating materials. One such lubricant is a water-soluble mixture in which the lubricant consists of three parts of water to one part of the lubricating compound.

In view of the susceptibility of stainless steel to scratches, tool marks, and so on, greater care must be observed in the maintenance of the drawing dies. A recommended practice is to polish the dies at regular intervals. This practice will cut to a minimum the amount of time which is usually required to polish the work upon comple-

tion of the drawing operation.

Tote boxes which are used for holding unfinished workpieces should be kept covered between operations to prevent dust or other foreign matter from contaminating the work in progress. Observance of these precautionary measures will result in the production of satisfactory work with a minimum of scratches or tool marks. The ever-present objective in drawing stainless steel, like that of any other type of steel, is to produce workpieces that will not show any appreciable scratches or defective marks after polishing.

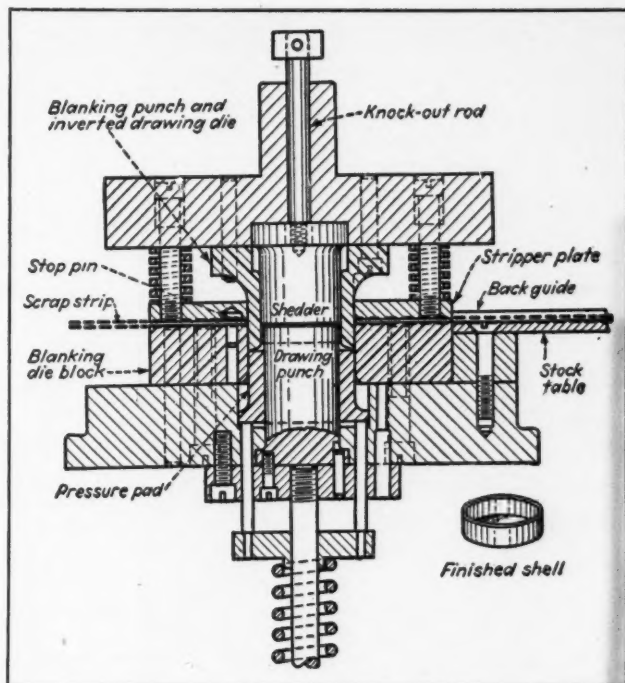
All radii on dies used for drawing stainless steel, and those on the nose of the punch, should be as large as possible in order to permit an unhampered flow of the metal around the punch and down into the die. It is usually necessary to anneal the work between each drawing operation, sometimes to a temperature of 1,950 deg. F., and at other times only 1,350 deg. F., depending upon the severity of the draw. Before annealing, the work

Fig. 1 — Illustration showing a vertical cross section through a horizontal plane of a combination blank and draw die which is used for producing a round shallow shell in one operation.

should be thoroughly sandblasted so that every particle of the lubricant used for drawing is removed. Any part of the lubricant left on the shells from the annealing furnace will form a gritty abrasive substance that is very injurious to dies.

After annealing, workpieces should be pickled in a 15 per cent solution of hydrochloric or muriatic acid, afterward in a 10 per cent solution of nitric acid, and then thoroughly sandblasted again. Sandblasting is very necessary and must not be sighted if best results are to be obtained. Do not use sulphuric acid as a pickle or for cleaning, as it has a tendency to discolor the work.

Dies for blanking, forming, sizing, and drawing stainless steels cannot be designed in the same manner as those for pressworking ordinary sheet steels, since stainless has an extra toughness, stiffness, and abrasive tendencies that cause greater wear on dies than other sheet steels. A comparatively recent innovation in working stainless is to surround the working parts of the die with inserted cemented carbide sec-



tions that will offset the extra abrasive tendency. In other words carbide rings around die openings may be used.

With deep drawing dies, it is best to use a carbide ring of an unusually large diameter. This design provides longer life to the die surface. It is on the die surface where there is considerable abrasive contact that a quick-sliding action of the blank perimeter between the die and blank holder surfaces occurs.

The faces of various carbide punches and die members can be ground on a surface grinder in the usual manner for resharpener. The time between grinds is many times longer than when high-speed steels are used. There are cases where 250,000 to 2,000,000 blanks have been cut before grinds. Obviously,



Fig. 2—Illustration showing a press designed for use in embossing letters and figures in metal signs.

bide wheels, which have a soft bond, or diamond-impregnated wheels. When silicon carbide wheels with a soft bond are used, the bond breaks down readily and thus exposes new sharp cutting grains in the steel.

Drawing Stainless Steel Sleeves

Gains in die life ranging from 10 to 1 to as high as 20 to 1 by using cemented carbide inserts in three out of four dies employed in a series of progressive drawing operations for stainless steel sleeves are reported by The NeuBart Stamping & Manufacturing Company, Los Angeles, California.

This represents an enormous saving of down-time in the pressroom. However, ordinary aluminum oxide grinding wheels commonly used for grinding hardened steels will not grind carbide dies efficiently. The best results have been obtained with either silicon car-

bide wheels. This company was engaged in the manufacture of stainless-steel sleeves or nipples used in the exhaust system of B-24 planes.

The process was somewhat unusual since there was a small reduction of wall thickness in which the stock was

SAVE

TIME and MONEY

with

SUPEREAM

STOP-PINS
AVAILABLE IN 5 SIZES



FINGER STOPS
IN 3 SIZES



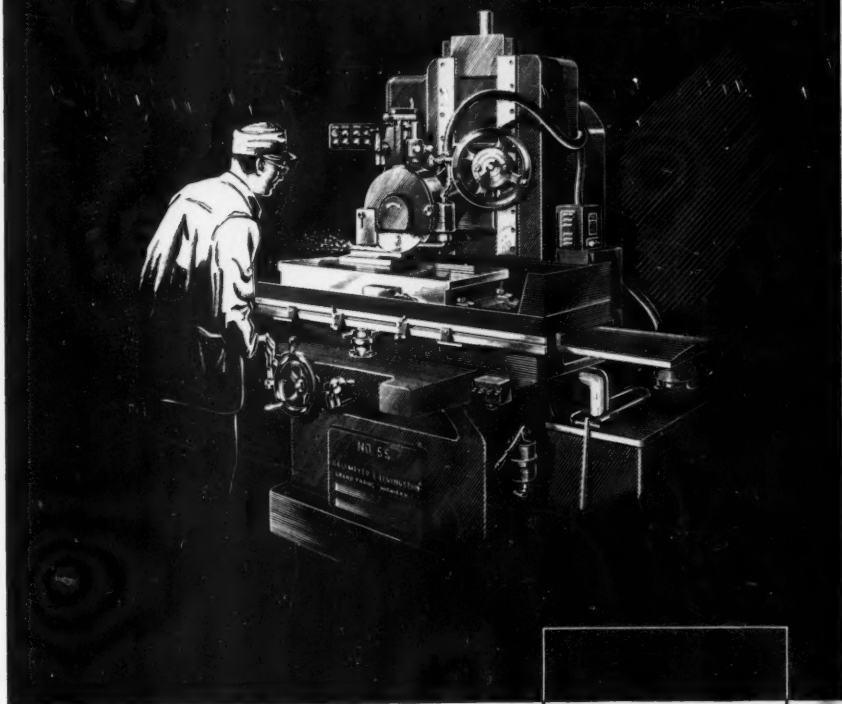
STOP-PINS are complete self contained units that hold securely in stripper plate. All sizes have 1/32" wall permitting insertion close to die or punch. No threads inside STOPS for springs to catch on. Write for literature and prices.

SUPEREAM FINGER STOPS made in uniform width to fit any standard width slot. Just grind ends to fit.

Write for literature

TWENTIETH CENTURY
MANUFACTURING CO.
3724 MONTROSE AVENUE
CHICAGO 18, ILLINOIS

WHEN THE DECISION IS PRECISION...



Where extreme tolerances are not required, the choice of any particular grinding machine may not be too important. But, where absolute precision is demanded, the choice is usually *Grand Rapids*.

Defense orders make it impossible to fill orders as quickly as we desire—but we know our customers can appreciate the reasons for delay. As always we'll do our best to serve you.

GALLMEYER & LIVINGSTON CO.
308 Straight Ave., Grand Rapids, Mich.

Grand Rapids Grinders

—World's finest



**GALLMEYER
& LIVINGSTON**



Fig. 3—Illustration showing operator performing the second drawing operation for an aluminum alloy shell in a hydraulic press. Illustration courtesy Aluminum Company of America.

ing dies previously used produced between 500 and 1,000 sleeves before it became necessary to re-grind the dies. The carbide-lined dies produced between 5,000 and 10,000 sleeves to required finish and dimensional tolerances before the dies required repolishing.

Combination Blank and Draw Die

The combination blank and draw type of die is popular with most manufacturers because of its efficiency, trouble-free action,

"ironed" thinner. In drawing the sleeves, a stainless steel blank was used, 0.063-inch gauge x 9 inches in diameter. The blank was first drawn into a cup 5½ inches in diameter. The next three operations, performed in dies having carbide inserts, reduced the outside diameters of the sleeves successively to 4, 3, and finally to 2½ inches.

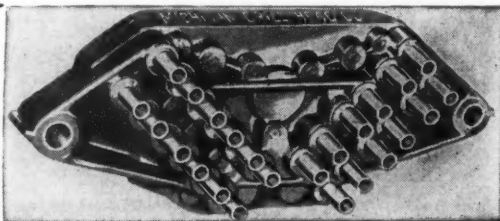
Production figures show that the various types of high-speed steel draw-

low cost, and ability to perform its allotted work in one operation. These dies are used largely for producing round shallow shells, or cups, such as used in kitchenware, shoe-polish boxes and covers, commercial containers, and many other useful articles. (See Fig. 1, where the die is shown closed and the shell completed.) The design of this type of die can be varied to provide for wide range of usefulness. For example, a cross section of the drawn shell may

Pictured: a 24-Spindle Heavy-Duty Drill Head.

**DESIGNERS AND
MANUFACTURERS
OF MULTIPLE DRILL-
ING EQUIPMENT.**

We Invite Your Inquiry.



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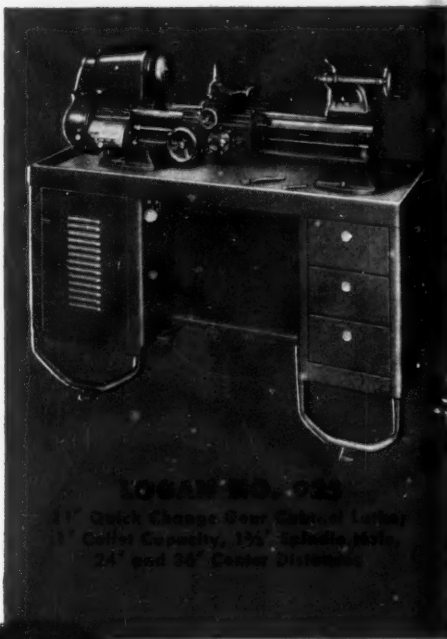
The Logan Lathe gives you spindle speeds of 45 to 1500 rpm with no bearing adjustment. A complete line of accessories further equips these versatile tools for every type of lathe operation.

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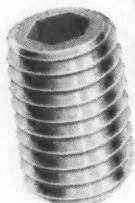
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be of triangular, square, hexagonal, rectangular, or of many sides and irregular shapes. Different outlines of openings can be blanked in the shell bottom, or lettering and trade marks

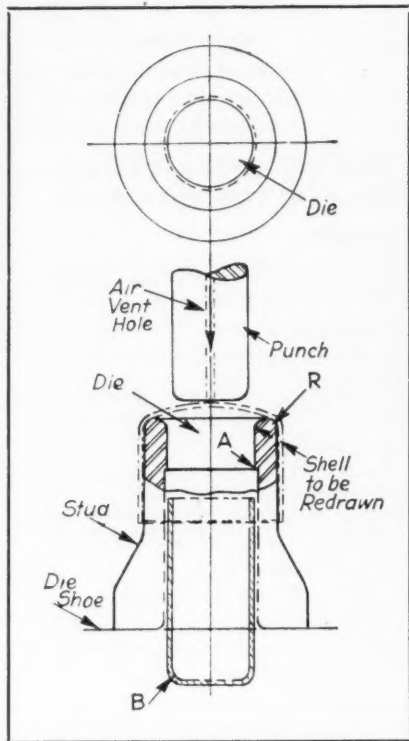


Fig. 4—Non-ferrous sheet metal shells can be redrawn by turning them inside out in a simple redrawing die as shown here.

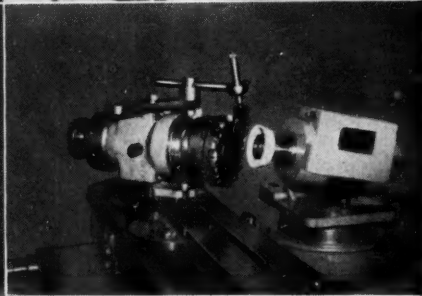
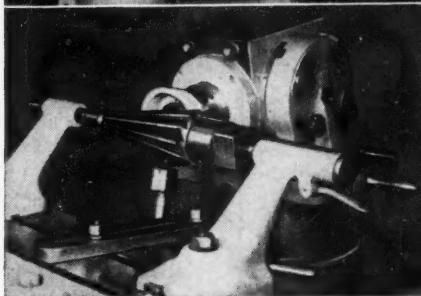
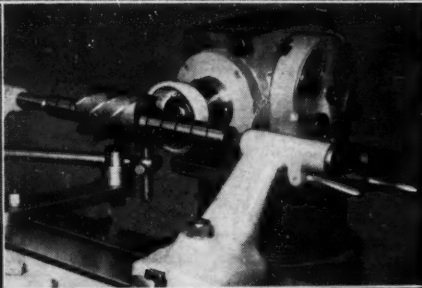
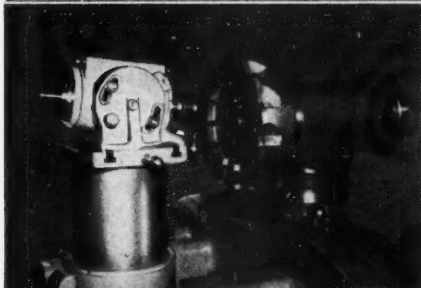
can be incorporated by placing stamps or characters in the drawing punch face or in the shedder face. At the completion of a downstroke, the letters will be stamped in the bottom of the cup.

Combination dies can also be designed to draw a cup with a pinch trimmed edge around its top, or to form a bead

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near the shell top, or a cup with a flanged rim. The latter type of die is frequently used to pierce holes, cut notches, or for trimming outlines, after which the shell wall is straightened out in another operation to complete the work. If a shell is deeper than the one shown in Fig. 1, the drawing punch should be provided with an air vent hole to neutralize any vacuum that might be created and thus permit easy ejection of the shell.

Circular combination blank and draw dies are rather economical to produce since all the working parts can be turned on a lathe, then drilled and tapped for attaching, hardened, finish ground, and assembled.

Drawing and Embossing

The job of embossing letters, figures, and border lines in large metal plates for railroad signs, road signs, and automobile state license plates is frequently performed in hydraulic type presses in penal institutions and metal stamping concerns, as shown in Fig. 2. The easily controlled dwell at the completion of the downstroke in hydraulic presses can be of sufficient duration to be particularly useful for drawing, embossing, and coining operations.

Drawing Large Shells Hydraulically

Figure 3 illustrates the second drawing operation for an aluminum alloy shell in a hydraulic press. The press capacity is 175 tons. Notice that the drawing punch is made with an angu-

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WAY 4-
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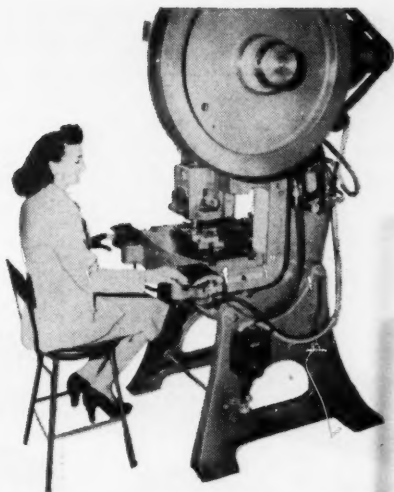
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lar flare around it which is positioned, from the end of the punch, a trifle less than the finished depth of the shell. At the completion of the downstroke, the punch flares out the rim of the shell top slightly for producing the start of a subsequent wiring ring in the next operation.

Turning Shells Inside Out

Nonferrous sheet metal shells can be

redrawn by turning them inside out in the simple redrawing die of the type shown in Fig. 4. The purpose of using this method is to prevent wrinkles and unnecessary operations. The shell to be redrawn is produced in a first operation and then annealed. The punch in descent pulls the shell down through the die and, on the return stroke, the punch carries the shell up and strips it off on corner **A**; it then falls out

beneath the die by gravity, as shown at **B**.

Wrinkles are prevented since no unconfined metal of the shell is exposed, and it is this uncontrolled metal that causes wrinkles and distortions. Another advantage is that a greater reduction in diameter can be made by turning shells inside out. Tapered shells can also be redrawn by this method. The metal should not exceed about $\frac{1}{8}$ inch in thickness and must be well annealed before redrawing.

The next article in this series will continue the discussion of designing, drawing, and redrawing dies.

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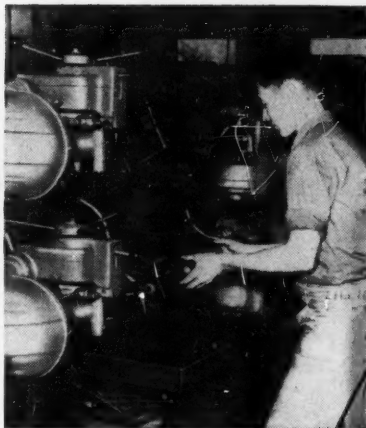
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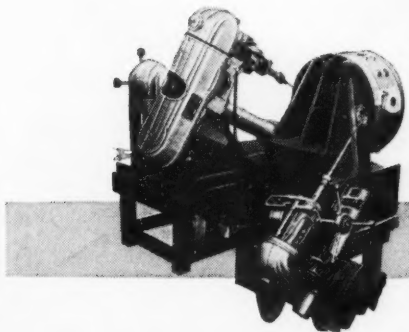


Talk about flexibility! Walker-Turner Drill Heads can be operated in any position, can be attached to other equipment, and are designed to operate continuously at any speed from 400 to 2600 or more r.p.m.

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(Top photo) 8 separate operations are consolidated into one! For this set-up, 4 standard Walker-Turner Power Feed Drill Heads were mounted horizontally to drill both ends of two double-end tube closures simultaneously.

← Typical of the flexibility of Walker-Turner Drill Heads is this special jig application. In designing the cumbersome fixture, provision was made for attaching the drill heads so that work can be handled in a natural position, speeding production.

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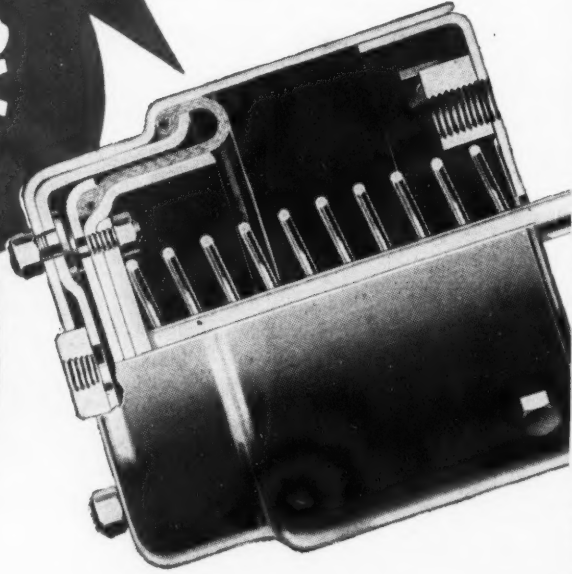
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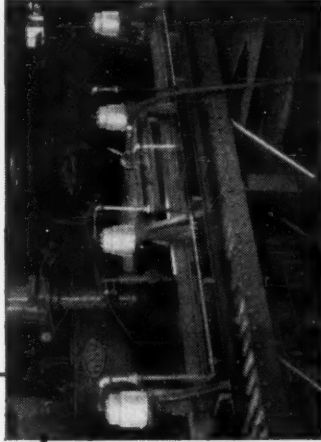
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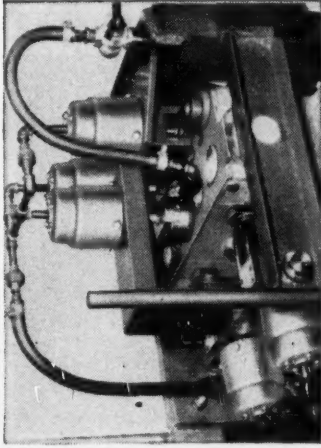
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Four Rotochambers installed on the fixture in this spot welding operation replaced cumbersome hand clamps, saving time, greatly reducing operator fatigue.



SPEEDS INSPECTION METHODS

Installation of Rotochambers on this water test operation for engine castings eliminated hand operated fixtures, thereby speeding inspection and cutting costs.



A woman worker at North American Aviation, Inc. displays a \$15,000 shipment of pure titanium. Improved processing techniques and current defense production requirements should lower the cost of an equivalent shipment to about \$1000 in the very near future.

Processing Titanium

By FRANK CHARITY

Experimental work at North American Aviation points way to wider application of titanium.

TITANIUM, a metal which weighs only slightly more than aluminum and yet has the approximate strength and hardness of stainless steel, is well-known to geologists and experimental metallurgists as the fourth most abundant structural material in the earth's crust. But in most modern metalwork-

ing shops it is virtually unused and unknown for a number of unique reasons, namely:

(1) With ore-processing techniques heretofore available, it has necessitated prices ranging upward from twenty-five dollars per pound—approximately the same as the cost of silver

Physical Properties of Pure Titanium

PROPERTY	Ti, Annealed	Ti, 1/2-Hard	Ti, Full-Hard
Ult. Tensile Strength	80,000	115,000	125,000
Yield Str., psi, 0.2% offset	72,000	105,000	110,000
Elongation, % in 2"	25	14	12
Density, lb./cu.in.	0.162	—	—
Mod. Elasticity, psi	15 x 10 ⁶	—	—
Ultimate Strength at Density x 10 ³ and Room Temp.	488	701	763
at 400° F.	318	520	586
at 800° F.	220	275	326
at 1000° F.	100	140	122

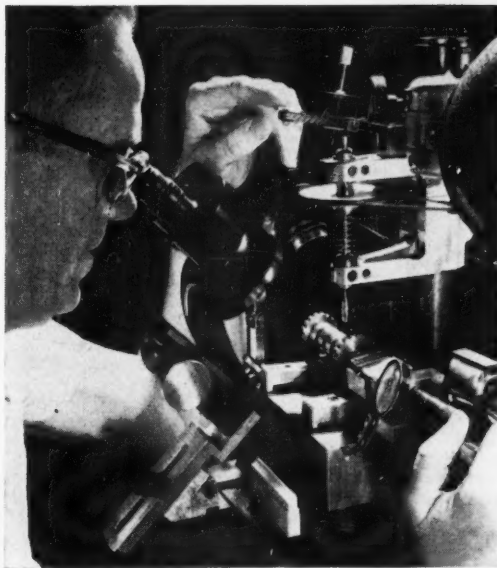
Although its hardness cannot yet be appreciably increased by heat treatment, titanium is comparable to stainless steels when evaluated by Rockwell hardness tests.

at the time of this writing.

(2) Although it is as corrosion-resistant as platinum and has a melting point of 3140 deg. F., titanium will oxidize at ordinary brazing temperatures (or temperatures exceeding 800 deg. F.).

(3) The metal is theoretically, but not actually, susceptible to standard fabricational and assembly techniques.

These factors have heretofore limited titanium to a rather minor role as an alloying element, since it can be readily blended with other elements; but now, thanks to the recent devel-



opment of improved ore-processing techniques and fabricational methods, it is believed that existent defense production requirements may soon lower the price of pure titanium to a level of about two dollars per pound, which should cause the metal to become a material of practical value in virtually every metal-working shop.

Defense production requirements, which are expected to

A special microscopic fixture is used in machining extremely fine and accurate details on a titanium-alloy aircraft part.



Tensile tests, as illustrated here, have proved that titanium is essentially as strong as stainless steel—even though it is almost as light as aluminum.

tion problem; but it is believed that North American engineers have attained results which are particularly significant and encouraging.

For example, the aforementioned brazing problem has apparently been solved by the development of equipment which makes it possible to use inert gases (such as argon and helium) in place of air as an atmosphere for heating operations so as to prevent oxidization. This equipment, incidentally, is similar to vacuum - metallizing units; and the brazing process consists essentially of assembling titanium parts in an airtight chamber,

whence undesirable oxygen is evacuated so that an inert gas can be substituted, prior to each electrical heating operation.

In terms of machinability, titanium is similar to austenitic stainless steel; and, for this reason, North American workers have made some use of high-speed steel (grade LXX) tools in fabricating titanium aircraft parts. How-

minimize the cost of titanium, are principally those of the aircraft industry; and in the latter field North American Aviation, Inc., of Los Angeles has been a pioneer in the development of new processing techniques.

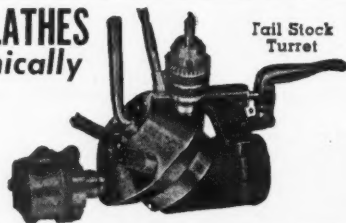
It would as yet be inaccurate to imply that any company or combination of companies has yet found a satisfactory answer to every titanium fabrica-

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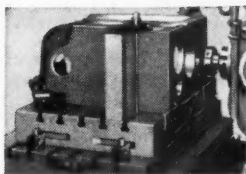
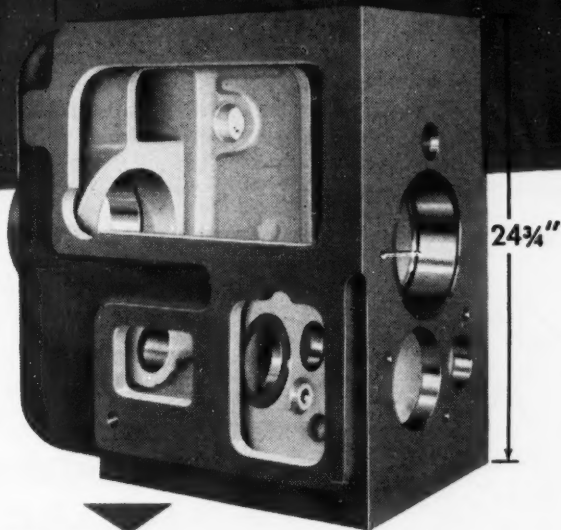
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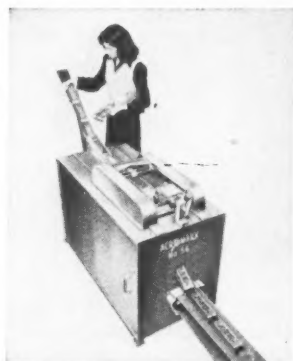
APPROX. COMPOSITION, %	Ult. Strength, psi	Elong., % in 1"	Minimum Bend Radius
5 Mn., 0.25 C.	190,000	4	Low
5 Cr, 0.1 N.	186,800	5	3t
5 Mn, 1 W.	190,700	5	3t
5 Cr, 0.25 C, 0.1 N.	183,200	6	3t
3.5 Cr, 2 Fe, 0.25 C.	190,700	6	3t
3.5 Cr, 2 Mo, 0.2 N.	190,000	7	3t
7.5 Mn, 0.25 C.	220,000	2	—

ever, evidence to date indicates that carbide tools, ground to approximately the same rake angles required for stainless steels, are most satisfactory in this connection.

Depths of cuts in titanium materials vary from about $\frac{1}{16}$ in. to $\frac{1}{8}$ in., where the materials have rough or unclean surfaces; but on surfaces that are clean and smooth, cut depths generally range from $\frac{1}{16}$ in. to $\frac{1}{8}$ inch. A speed of 400 r.p.m. is usually preferred in

work with materials up to 2 in. in diameter; and regardless of dimensions, speeds exceeding 600 r.p.m. are avoided in lathe work, since frequent tool re-grinding would otherwise be necessary. Cutting lubricants or oils are rarely used in machining titanium, since the latter in finely-dispersed form is pyrophoric and might create an undesirable fire hazard in the presence of organic liquids.

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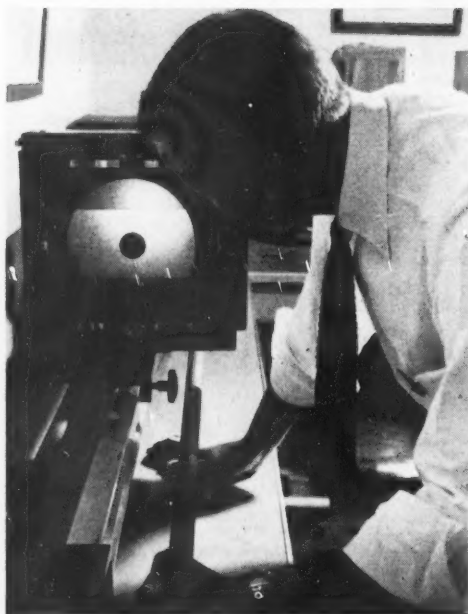
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The microstructure of titanium sheet stock is observed with a metallograph by an engineer at North American Aviation, Inc. The sheet specimen was polished to a mirror-like finish and then etched for use in connection with this inspection.

thick) have been used for such purposes with relatively-good results.

Both pure and alloyed titanium materials have been forged without special equipment. However, experience has disclosed that heating to more than 1800 deg. F. must be avoided in preparing the materials in order to prevent excessive oxidization; and special allowances have to be made for titanium's thermal expansion coefficient to prevent "freezing" of the dies and materials as the latter are forged.

Most conventional types of welding equipment have been used to assemble titanium aircraft parts; but, as yet, the most consistently-good results have been attained with resistance welding machines and electric-arc torches with inert-gas accessories. Where the titanium parts were bonded to one another, strong joints were produced without difficulty by means of standard elec-

the best finish in grinding titanium. Hard wheels have a tendency to load up and drag, or to shatter (since they may cut and weld to titanium materials).

Cut-off operations are exceedingly tedious where titanium is machined with a bandsaw, even where coarse-tooth blades are utilized. However, wet abrasive wheels (0.02 in. to 0.04 in.



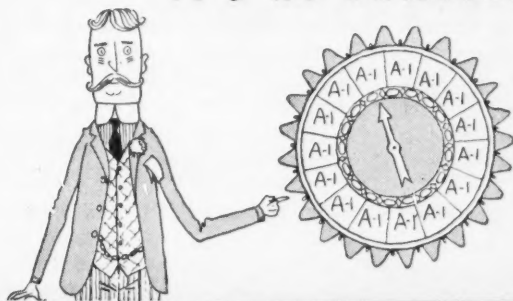
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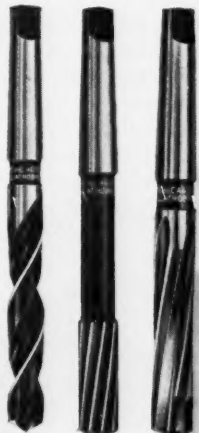
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trodes, pressures, and currents; but, where it was necessary to weld pure titanium to dissimilar metals, a number of paradoxical problems were encountered—although reasonably good results are now being attained in the fusion of titanium with 18-8 stainless steel, NAX low-carbon steels, and Inconel by means of carefully-timed welding cycles.

In terms of plasticity, titanium

should be one of the most readily extruded metals; but, at present, processing efforts of this type have been experimental and inconclusive. Similarly, efforts to cast and swage titanium have been rather unsuccessful (due to the aforementioned oxidization tendencies); but North American engineers have expressed the belief that a satisfactory investment casting process (involving the use of an inert atmosphere)

is at least within the realm of possibilities for the immediate future.

Annealing

When it is annealed (at temperatures ranging from 570 deg. to 1300 deg. F. for various periods of time in different circumstances), titanium sheet (0.02 in. to 0.07 in. thick) can be bent or formed with press brakes and related types of equipment. Minimum bend radii range from 2t (for fully-annealed sheets) to 4t (for half-hard sheets).

Titanium is heat-treated at the higher temperatures (for optimum results with maximum speed) with inert-atmospheric furnace equipment;

UP GOES PRODUCTION -

DOWN GO COSTS!

with **FEDERAL DIAL FEEDS**

These rugged, precision-built Dial Feed Presses are pets in many press rooms. And rightly so. They speed production often three to six times—cut down-time, reduce accidents, and eliminate more expensive equipment. Finest materials and workmanship. Six to 80 tons. Automatic feeds and ejectors if desired.

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FEDERAL DIAL FEED **PRESSES**
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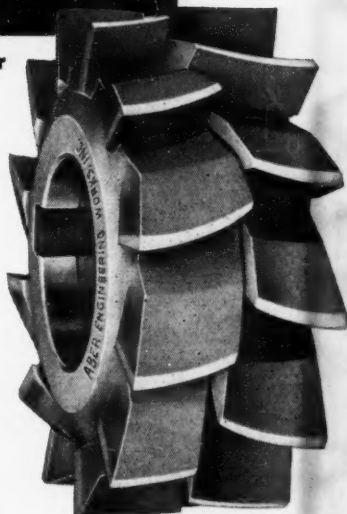
...With An Aber Curved Tooth Milling Cutter

Objectional chatter marks from standard type cutters surprisingly resulted in increasing production from 4,000 to 20,000 pieces per grind

Eight months ago a manufacturer experienced difficulty in obtaining a smooth surface on a side milling operation while using standard type cutters.

Aber "Curved Tooth" right and left hand shear side milling cutters were recommended to eliminate chatter marks. NO THOUGHT WAS GIVEN TO INCREASING PRODUCTION.

The results proved outstanding — After eight months of continuous operation, without once removing the cutters from the machine, Aber "Curved Tooth" cutters produced 20,000 pieces against previous peak outputs ranging between 3,000 and 4,000. In addition the cutters are still producing pieces within specified tolerances and with a finish finer than that obtainable with NEW standard type cutters.



Here Are the Facts

OPERATION DATA

MACHINE: U. S. Multimiller

TOOLS: Aber "Curved Tooth" right and left hand shear side milling cutter. 3" x 3/4" x 1 1/4"

MATERIAL: Bronze Turbine Blades.

COMPARATIVE PERFORMANCE

	ABER CUTTER	STANDARD CUTTERS
S. F. M. Speed:	400 fpm	400 fpm
Feed per Rev.:	16" per min.	12" per min.
Depth of Cut:	3/8"	3/8"
Pieces per Grind:	20,000 and still going strong	3,000 to 4,000 maximum

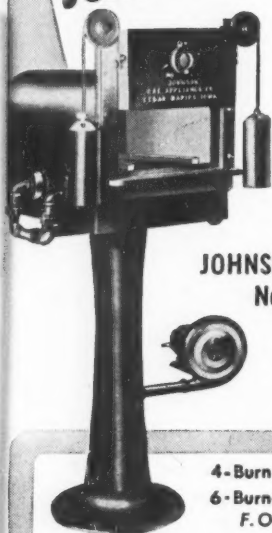
You too can profit by applying Aber "Curved Tooth" milling cutters for increased production and reduced rejections due to off-tolerance, unsatisfactory finish milling operations. Remember every Aber Tool has the exclusive, patented "Curved Tooth" design providing chatterless, smooth cutting action.

ABER

ENGINEERING WORKS INC.
WATERFORD, WISCONSIN



**TURN THE HEAT
ON HIGH SPEED STEELS
Quick Acting
JOHNSON FURNACES**



**JOHNSON Hi-Speed
No. 130A**

4-Burner \$295

6-Burner \$325

F. O. B. Factory

**High Uniform Temperatures
at LOW COST**

Quick Acting **JOHNSON No. 130A** is available in two temperature ranges. 4-Burner unit is for steels requiring 1400—2350° F., and 6-Burner unit for 1800—2400° F. Powerful, efficient burners fire under hearth assuring fast, uniform heat. Save time and gas. Easily regulated. Firebox 7x13x16½ lined with high temperature insulating refractory. Complete, ready for action with Carbofrax Hearth, G. E. Motor and Johnson Blower. Order Today!

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Johnson Gas Appliance Co.
571 E Ave. N. W., Cedar Rapids, Ia.

and, as a rule, heat treatment serves the exclusive purpose of relieving cold-work stresses. However, there is every reason to believe that current efforts to heat treat titanium for improved surface hardness will eventually be successful.

Generally speaking, titanium and its alloys are now being used in the North American plant to replace stainless steel (and, consequently, to reduce the weight of high-speed jet-propelled airplanes—for example, in the construction of engine shrouds, firewalls, heat-resistant ducts, compressor discs and blades, armor plating, and so on. Most of these applications involve the more or less constant exposure of parts to operational temperatures of 300 deg. to 800 deg. F.

For further information on any product mentioned in this issue—use the **READER SERVICE CARDS** between the covers.



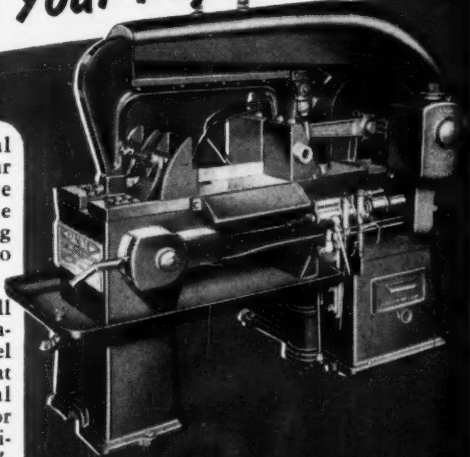
"Besides the defense contract you just signed, we also need your signature on a few copies for the Pentagon!"



Obsolescence Keeps These Fellows On Your Payroll

New, Modern, RACINE Metal Cutting Machines step up your entire production. They save material — reduce cut-off time and lessen subsequent machining operation because they are so extremely accurate.

Savings in your metal cutting will help offset ever-mounting tax, labor and material cost. Late model RACINE Power Saws hit costs at the first stage in every metal working job — where the bar or billet is cut to size. All capacities — 6" x 6" to 20" x 20". Single purpose or fully automatic bar feed units.



RACINE

STANDARD
FOR QUALITY
AND PRECISION



Fig. 1—The jet container is cylindrical in shape as shown here and may be easily transported to site of installation.

Rheem Supplies Containers For Jet Engine "Canning"

LARGE steel containers, in which huge jet aircraft engines are "canned," shock-mounted and sealed against humidity, are being delivered to the U. S. Air Force by Rheem Manufacturing Company, leading American producer of steel shipping containers.

The special containers, for J-35 and J-47 turbo-jet engines, were developed by Rheem for the Air Materiel Command. They protect jet engines both from damaging vibrations in transit and from the harmful effects of moisture during storage over indefinite periods, even in the open and without inspection or service.

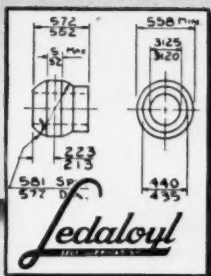
During an amphibious operation engines in these containers actually can be lowered overboard and floated ashore without damage. The container was developed to provide a storage and shipping medium which would not re-

quire regular inspection and service, and repairs after each use, as did the wooden crates used previously.

The first steel engine containers, designed for piston (radial) engines, were basically over-size versions of the familiar oil drum, sealed mid-way between the ends of the drum and provided with shock mounts and humidity control and indicators. Rheem currently manufactures large quantities of the radial engine container for the Air Force, the Navy and Pratt and Whitney, in sizes ranging up to the giant four-row engines which power the Air Force B-36.

Development of a similar container for jet engines posed numerous problems, because such power plants are mounted differently than radial engines and are more sensitive to vibration in transit. The Rheem jet con-

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Johnson Ledaloyl Bearings in numerous self-aligning styles are designed to slip into place and adjust themselves to shaft position. They require no machining, no fitting. They are produced by powder metallurgy and are self-lubricating. Catalog L-5 shows designs of items and lists sizes available from stock.

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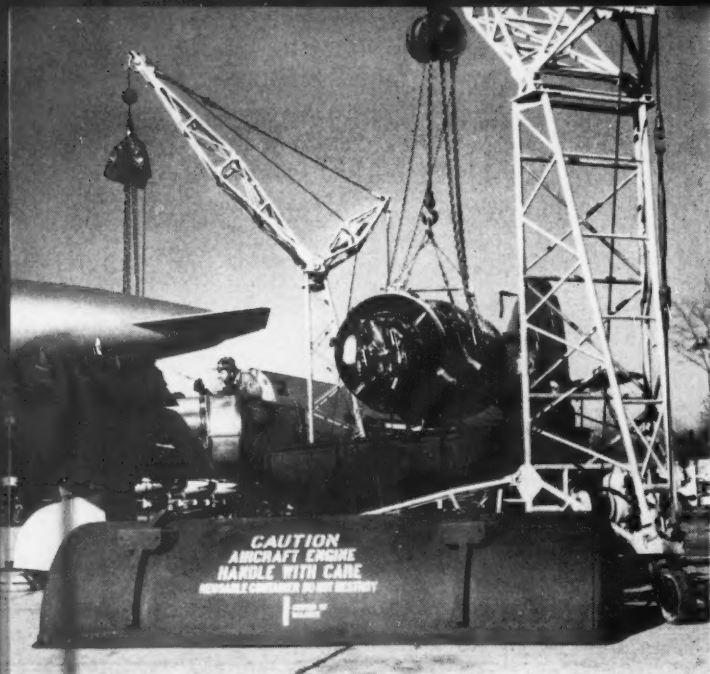


Fig. 2 — Illustration showing jet engine being removed from new type storage and shipping container.

tainer is cylindrical in shape, as shown in Fig. 1, but is designed to be placed horizontally rather than vertically. It opens along a longitudinal seam into two halves shaped somewhat like bath tubs, as shown in Fig. 2. The container is mounted on skids so it can be towed along difficult terrain and still keep the engine in the proper position.

Engines of both types are placed in containers on completion of testing at the assembly plant. Each container is hermetically sealed and filled with dehumidified or dried air under light pressure. Relief valves release pressure if it builds up too high, and an external humidity indicator shows if moisture enters the container.

Removing engines from the steel containers of both types requires two man-hours or less, and can be performed simply by removing the bolts from its outer seam. The engine mounting bolts are readily removed from the

elaborate shock-mount system inside the container.

The shock-mount system was developed with great care to insure against an engine vibrating "in resonance" with, say, a railroad freight car during shipment. Should a resonant condition be set up by such vibrations,

the engine could be shaken apart, just as troops marching in cadence across a bridge could set up vibrations which would cause it to collapse. The shock mounts were designed so that any vibration reaching the inside of the container will be "damped," or slowed, before the engine reaches the danger point—of vibrating at the same frequency as the car.

Rheem engineers developed the jet container in close collaboration with engineers of the Aviation Gas Turbine Division of General Electric and the Air Materiel Command, U. S. Air Force. The Rheem radial engine container was developed from an original type pioneered by the Navy Bureau of Aeronautics and Pratt and Whitney engineers.

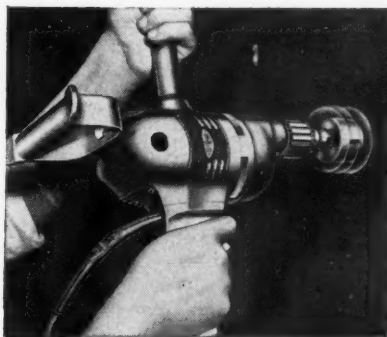
Service experience with containers for both jet and radial engines has demonstrated that their durability, the



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SIoux Drill and Hole Saw in operation.
One of a number of combinations that
you can rely on to deliver...if you have
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STANDARD THE



WORLD OVER

effectiveness of their moisture-proofing, ease of use, freedom from service and repairs and the added tactical advantage of flotation make it practical for the Air Force and Naval Aviation to receive their new aircraft engines "canned like peas."

Materials Handling Film

A sound motion picture in color on the application of industrial trucks and

hoists is now available from the Philadelphia Division, Yale & Towne Mfg. Co., 11000 Roosevelt Blvd., Philadelphia 15, Pa. Designed for showing before materials handling, warehousing, traffic, methods, engineering, and general business groups, the 22-minute film illustrates a wide variety of attachments on the respective trucks for handling bulk materials, bales, kegs, boxes, rolls, bins, and other items.

Entitled "Top Performance" (a cir-

cus motif is used throughout), the film shows how modern materials handling is used to save dollars, physical exertion by employees, time, and floor space in all branches of business activity. Equipment covered in the film includes gasoline and electric fork trucks; motorized stackers; platform and pallet trucks; and hand and electric hoists. Attachments shown incorporated on this equipment include a brick clamp, bale clamp, wide reach clamp, carton clamp, bottom dump hopper, hydraulic scoop, and automatic pallet unloader. Further information on the film will be sent upon request.



Rebuild Worn Parts by Metallizing

Save time, money and critical parts by Metallizing with new Mogulectric Gun. Adds metal to metal with fine atomization for perfect bond. Simplified, easy to use, engineered to give trouble-free service.

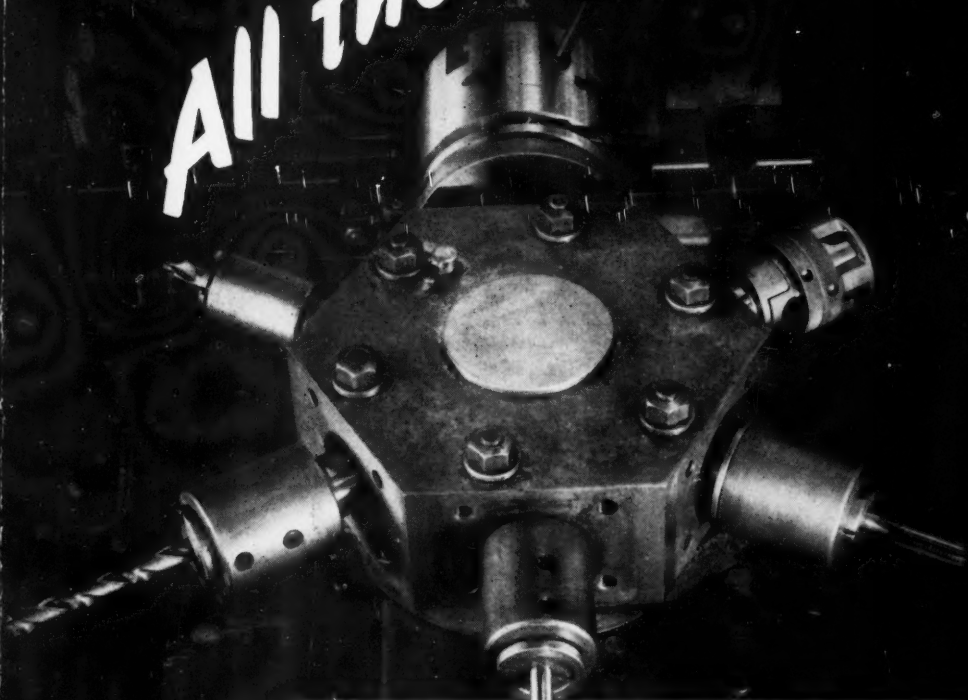
Also ideal for spraying corrosion-resistant metal coatings and for production work.

If you already have metallizing equipment, why not consider a trade-in now for the new Mogulectric Gun.

Write for new booklet containing complete information on equipment as well as production and maintenance applications.

METALLIZING COMPANY OF AMERICA
3520 W. Carroll Avenue • Chicago 24, Ill.

All these

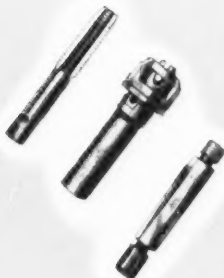


and
gages—
tool

Yes, only GREENFIELD with its GEOMETRIC Division manufactures in its own plants, a complete line of Cutting Tools plus Gages! Yes, only GREENFIELD could duplicate the above tooling and top it off with all necessary Gages.

REGULAR STOCK ITEMS

	Capacity	
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TAPS AND COLLAPSING TAPS	0-80	8 1/2"-8
DIES and DIE HEADS	0-80	6"-7
GAGES—THREAD	0-80	1 1/2"-6
GAGES—PLAIN059"	4.510"
DRILLS	#80	3 1/2"
REAMERS	7/0	2 1/2"
END MILLS	1/16"	2"



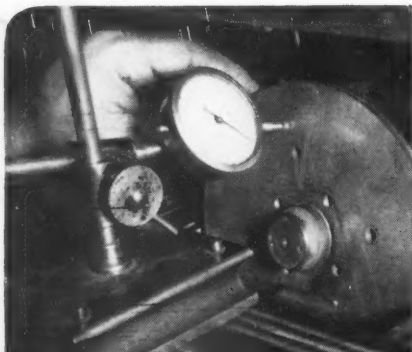
BUY TOOLS WITH CONFIDENCE BUY GREENFIELD TOOLS

GREENFIELD TAP AND DIE CORPORATION

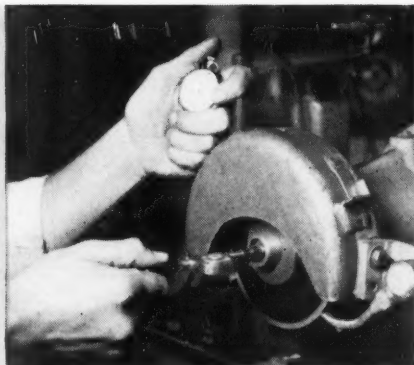
GREENFIELD, MASSACHUSETTS

Tips on Diamond Wheel Operation

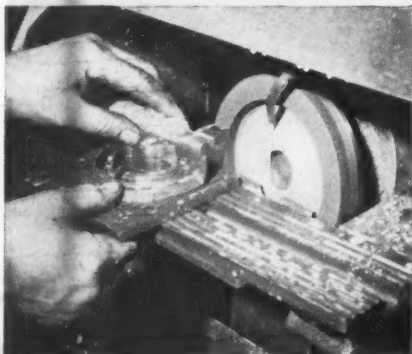
THAT WILL *Lengthen Wheel Life* *and Cut Carbide Grinding Costs*



BE SURE SPINDLE AND BACK PLATE RUN TRUE. Before mounting a new wheel, check the spindle and back plate for possible runout. The backs of all Norton diamond cup wheels are precision ground to absolute parallelism with the cutting faces. So, if the spindle and back plate run true, the cutting face of your Norton mounted wheel will also run true.



MAINTAIN CORRECT WHEEL SPEED. For best results, run resinoid and vitrified bonded wheels around 5000 surface feet per minute. At lower speeds they cut slower and wear faster. Metal bonded wheels can be operated at speeds as low as 3000 s.f.p.m.

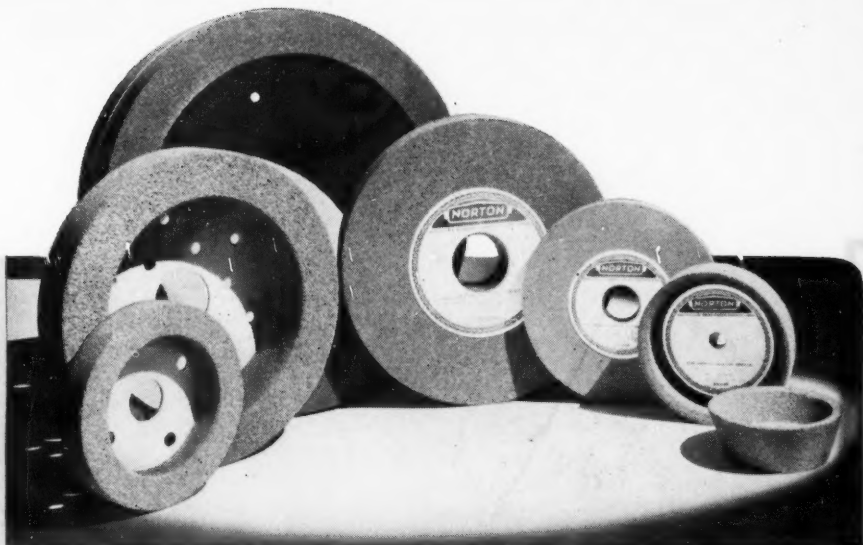


GRIND WET WHEREVER POSSIBLE. Use a thin mixture of any standard water soluble grinding coolant. If stream is not available, use felt wick saturated with mixture of kerosene and light spindle oil or with a water soluble oil.



TRAIN YOUR OPERATORS. In the interests of better grinding practice, Norton maintains a large library of educational films in sound and color. It will pay you to show your own employees the films on carbide grinding and on the care of diamond wheels. They are loaned without charge.





AND ...Investigate The New K-Bond Crystolon* Wheels

Faster, freer cutting silicon carbide wheels with greatly increased uniformity in grinding action. This new vitrified K-Bond can be so accurately controlled that wheels of half-grade increments of hardness are possible — enabling you to “pin-point” specifications to your in-

dividual needs. Norton K-Bond CRYSTOLON wheels also reduce costs by widening the scope of silicon carbide abrasive. In many cases they permit saving your more expensive diamond wheels for finishing, since they do numerous rough grinding jobs with entire satisfaction.

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

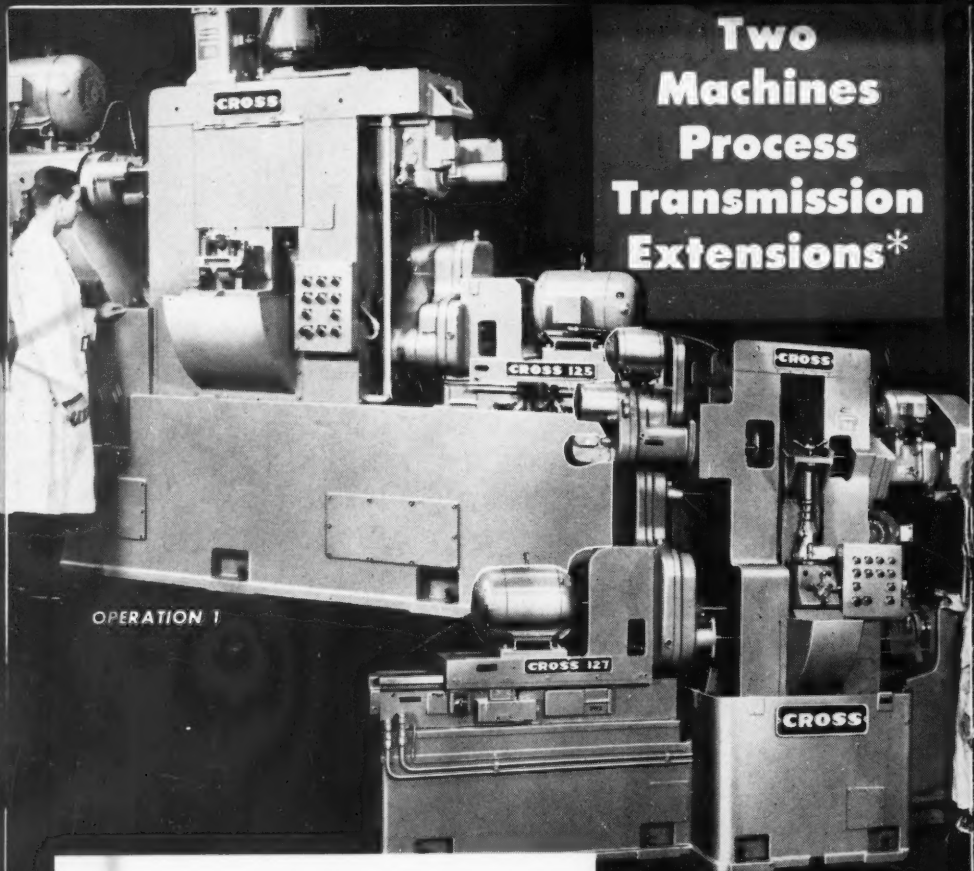
TAKE ADVANTAGE OF NORTON KNOW-HOW

Your Norton Distributor has much to offer you besides Norton's top-quality products. He is also your contact point for a vast store of knowledge covering every detail of abrasives and grinding — available through Norton Abrasive Engineers located in every industrial center, and through the Norton staff of specialists in Worcester. See your Norton Distributor for the right wheels to use for your carbide grinding applications, and ask him for this free 140-page booklet on carbide grinding. Or write direct for FORM 167, NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities.



Making better products to make other products better

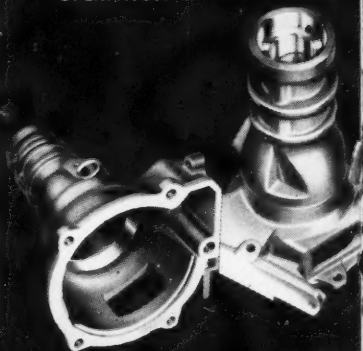
Two Machines Process Transmission Extensions*



OPERATION 1

- ★ Operation 1: bore both ends; face large end; ream flange holes in large end; oil groove small end; chamfer and tap two holes in mounting flange.
- ★ Operation 2: mill mounting flange; drill, bore, chamfer and tap speedometer hole complete; drill, chamfer and tap two inspection cover holes.
- ★ 125 pieces per hour at 100%.
- ★ Features: J.I.C. standard construction; power operated indexing trunnions; fluid motor drive for indexing; single point tool for cross-facing flange of large end.

OPERATION 2



*Except for finish bore

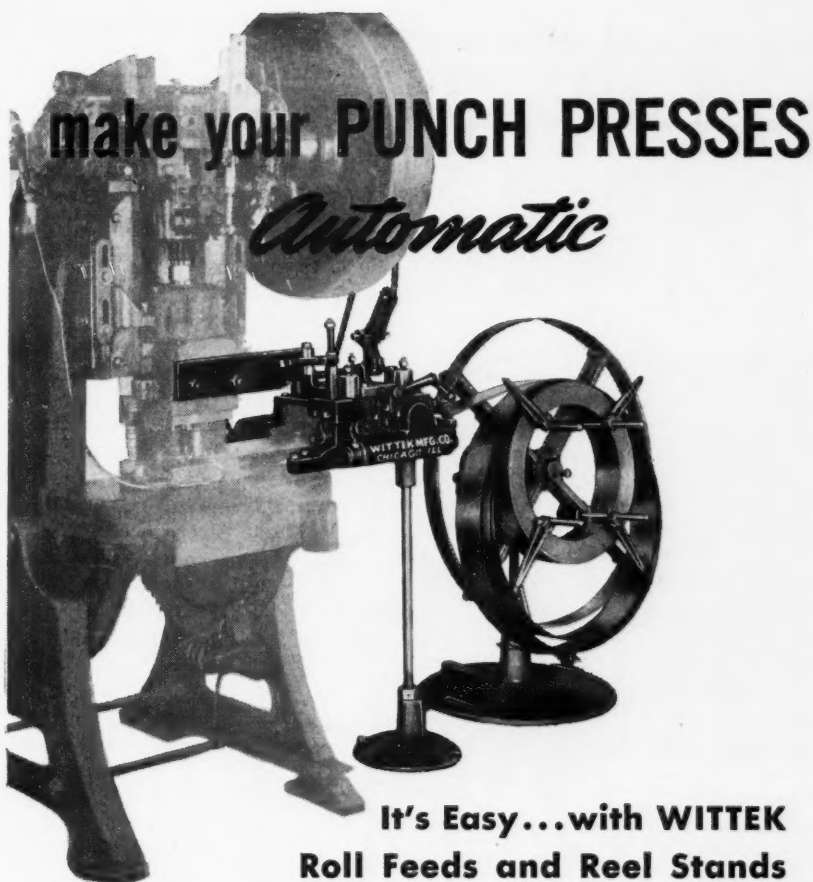
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Wittek Roll Feeds handle any type of coiled strip stock and are made in single roll, double roll, and compound types with straighteners, in models to feed in any of four directions. They are reliable and accurate with simple, quick adjustment of feed length. Standard sizes and models meet a wide variety of press size and capacity conditions.

Wittek Reel Stands facilitate handling coiled stock.

Write for full particulars

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4322 W. 24th Place, Chicago 23, Illinois



Little Chats On Practical Psychology

Number 4—Dead-Pan Pete

THE "indifferent" type of individual seems to be totally unconcerned or uninterested in whatever you may say or do. He apparently goes about his own job well enough, earns his pay, but seems to have no real initiative or interest in much of anything. When you present a new idea to him, he thinks it is sound enough, but he hardly seems to think it is worth the effort to do anything such as you are suggesting. To all intents and purposes he is mentally inert.

In handling this type of worker, first realize that his apparent indifference may be pretty much of an act. There is, after all, no person who is really wholly indifferent. All of us have someone or something that is important to us. Your task in handling the "dead-pan" is to lead him along in a friendly conversation until he gives you some clue as to the possible areas of his hidden interests. Just as there are "hidden"

knacks in doing a job, there are hidden motives and desires and interests within this apparently indifferent individual. Dig them out and appeal to them in getting his cooperation.

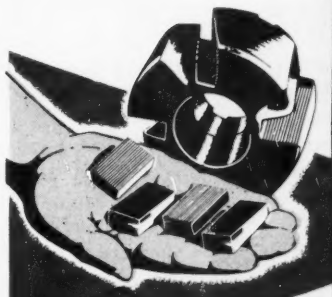
Of course, this may take several days or even several weeks, because you seldom have enough time to engage, on the job, in any lengthy conversations. You can hardly, for example, discover a man is interested in fishing, and then spend the next two hours talking about it. Your objective is to get his active



cooperation, not to spend the morning swapping fish stories.

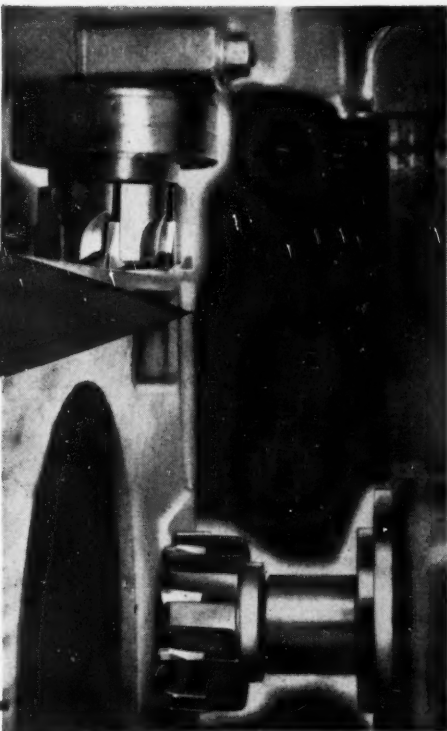
Sometimes it is effective to "jar" these people a bit by showing them that through their apparent indifference or inertia they stand to lose a promotion, are daily endangering themselves through neglect of some safety precaution, or in some similar way use their hidden interests as your leverage with-

40 in. Gray Planer-Miller
equipped with OK Carbide End and Face Mills
for milling top and side of heavy
cast iron machine frame



OK

carbide cutters for faster metal removal



Authorities agree that rigidity is the prime essential in carbide milling. Adequate support of carbide tips and cutting edges is the first consideration, because the transverse rupture strength of available carbide cutting materials is relatively low. Two means should be used to provide adequate support: First, a cutter body substantial in size and strength, and second, bodies so designed that substantial support extends as close to the cutting edges as is practical, considering chip clearance and clearance for diamond grinding wheels.

OK carbide milling cutters do provide substantial support in all necessary ways. The body is of heat-treated drop-forged steel and is of a design to support the blades close behind the cutting edges. The blades are of alloy steel with carbide tips brazed carefully into machined recesses in such a manner as to harden the blade.

Blade slots in the body are tapered, one side of the slot being flat, the other serrated. When the serrated wedge-shaped blades are driven into their respective slots in the body, the matching

serrations prevent any lateral movement. No pins, screws, clamps or other holding devices are needed.

OK Carbide Milling Cutters are of the Dual Adjustable type. Three angles govern location of the blade in the body: the axial and radial rake angles and the angle at which the blade is inclined toward the face of the cutter. This combination saves you money and grinding time.

For when worn blades are advanced outward in the body by one serration, the ratio of radial to axial movement is about 4:1. This proportion is in accordance with our experience with wear of milling-cutter blades on medium and heavy-duty applications. Thus, most of regrinding is done along the side of the carbide insert which takes the maximum wear, thereby extending its useful life.

For complete details of OK Carbide Milling Cutters for milling cast-iron, steel and non-ferrous materials, write for a copy of Catalog 13, "OK Modern Milling Cutters for Modern Milling Machines."



OK

modern milling cutters for modern milling machines

THE OK TOOL COMPANY, Milford, New Hampshire

out ever mentioning them directly.

Once in a while you'll find a "boss" or a fellow-supervisor who appears more or less indifferent also. Sometimes the direct, blunt, straight-forward approach is effective with this type. One such experience is worth noting:

The superintendent in the shipping department had been fussing and stewing for several months over the pile-up of materials on the loading dock, in

the area supposedly set aside for packing and crating and the general confusion resulting from poor planning at the point of final inspection. He gave this problem a good deal of thought, and then walked in to see the "super"—who was a typical Dead-Pan Pete.

"What do you want to see me for?" said the super.

"I came in here to tell you how we can eliminate the confusion in the shipping department and eliminate all

the overtime I've had to have my crew put in for the past few weeks."

"All right—tell me."

The superintendent told him, for twenty minutes. The super sat there, never smiled or opened his mouth. After 20 minutes the superintendent said: "Well, that's the story. Now you talk."

The super grinned finally, reached into a desk drawer and pulled out a folder of papers and plans: "I've been looking into this matter myself for the past month, and yours is the first clear-cut program I've seen. Now let's get down to cases."

KEEP THINGS *MOVING* with a

Handles the jobs that are too "tough" for powered belt units. Undamaged by sharp corners or rough edged work. Supplies dependable power in gravity lines.

Work can be slowed or held without stopping conveyor.



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"LIVE ROLLER"
**POWER
UNIT**
**4 STANDARD
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Regardless of quantity or type, you'll profit by specifying Adams custom made gears for your product. Made on the most modern gear cutting machines by skilled workmen, Adams gears are quality controlled to guarantee exact conformance to your specifications. Write today for further information. THE ADAMS COMPANY, 1942 Cypress Street, Dubuque, Iowa.

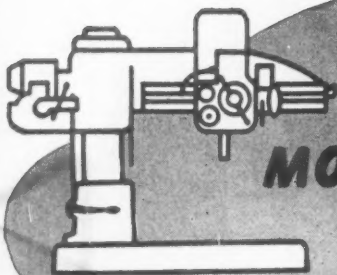
The ADAMS Company

Dubuque, Iowa, U. S. A.

ESTABLISHED 1883

FINE GEARS MADE TO
YOUR SPECIFICATIONS





MODERN EQUIPMENT AT WORK

Turret Punch Press Saves Time in Sheet Metal Parts Production

LITTLEFORD Bros. Incorporated of Cincinnati, manufacturer of sheet metal parts of all kinds including gear guards, machine tool covers, machine bases, and similar equipment has found the Model R41-P Wiedemann Turret punch press ideally suited to their production needs.

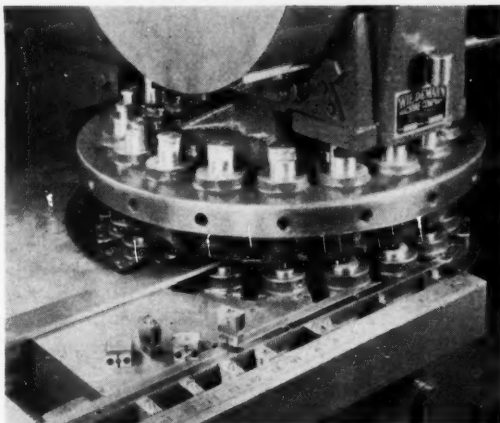
As shown in the accompanying illustration, Fig. 1, the punch press is being used to pierce holes of various sizes in a specially designed radio tube mounting panel. Unusual high accuracy has been obtained on this job which is but one of the nearly one thousand different types of workpieces processed in this plant on this machine. Materials vary greatly and include mild steel up to 10 gauge thickness, stainless steel, and aluminum.

The Wiedemann Model R41-P punch press provides for sixteen stations, each station of which carries any size punch and die within a wide range. These punches and dies range in size from



Fig. 1—View showing Wiedemann Turret Punch Press being used to punch out various size holes in radio tube mounting panel at Littleford Bros. plant.

Fig. 2—Closeup view of rack type gage used on Model R41-P Wiedemann Turret Punch Press. Workpieces are accurately positioned for cross dimensioning by means of the disappearing pin stops shown. The stop pins are located from the direct reading scale and are positive with no slipping or moving possible. The back gage and direct reading dial are used to position the gage bar for in-and-out dimensioning.



$\frac{1}{8}$ inch up to 3 inches. The largest, or 3-inch punches, are currently being used to pierce holes in metal up to 16 gauge thickness. Considerable use is made of slot punches whereby rectangularly shaped openings are cut out progressively in order to make large openings within the area of a metal sheet. Other methods of cutting the openings have been tried, but none has been found to be as fast or as efficient as the method provided by the Wiedemann punch press.

Accuracy in the operation of this press is maintained through the application of both a longitudinal rack type gage and a back type gage against which the work is positioned before punching. Small removable stops with disappearing pins, shown in the close-up view of the machine, Fig. 2 are provided for insertion in the rack type

gage at intervals of $\frac{1}{64}$ th of an inch. A handwheel which is conveniently located at the front of the punch press is used for accurately adjusting the back gage to the desired depth. Maximum depth to which the back gage may be set is $26\frac{1}{2}$ inches.

The rack stops and back gauge bar are set up to the required dimensions of a job. The dimensions may be set up directly from the drawing or if it is a repetitive job, may be charted for future reference. Ease of setting up the various jobs by means of this method on the Wiedemann Turret Punch Press has reduced to a matter of seconds the time on many jobs which formerly required 10 to 15 minutes to produce.



Monarch Precision SHAPLANE Radius Tools

Illustration shows convex cutter for $\frac{1}{4}$ " to $2\frac{1}{2}$ " balls.

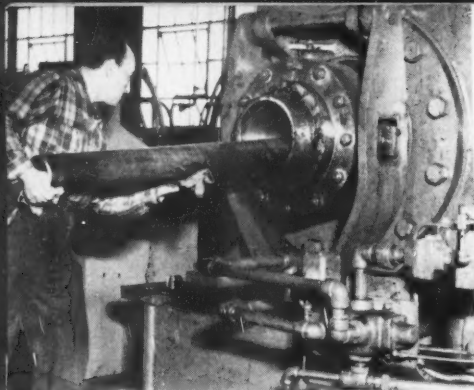
FIVE MODELS for LATHES, SHAPERS, PLANERS, BORING MILLS

Range $\frac{1}{2}$ " to 3" for concave Radii. Also heavy duty models for radii to 6" on planers, etc.

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PENDING

Write for circular

C. B. TEETER, TOOL ROOM SPECIALTIES
4470 Oakenwald Ave., Chicago 15, Ill.



Loading rocked tube blank into hollow spindle of forming machine for hot-forming landing gear side brace

Hot-Forming Machines Aid in Economical Production of Tubular Parts

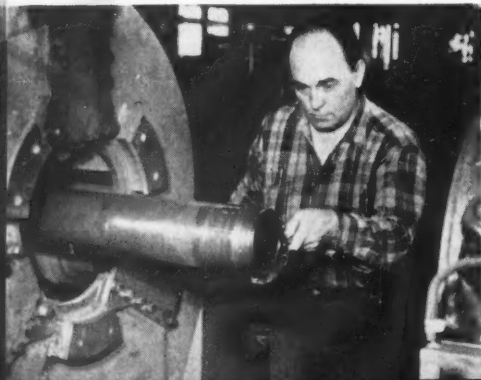
NEW production economies are being achieved due to the recent addition of two Westin process machines at the plant of Tube Reducing Corp., Wallington, N. J., which is now equipped to produce for the trade a complete line of compression-formed precision tubing and to perform up-setting operations all under one roof, thus reducing transportation costs since handling between processing points is eliminated. In addition, plant operators can detect and report rejects immediately, thereby avoiding large overages of tubing and assuring prompt shipment of finished formed parts.

The new machines hot-form the ends of tubing into parts such as braces and struts for aircraft landing and flap con-

trol gear, rocket and jato bodies with convergent-divergent nozzles, compressed gas bottles, completely closed tubes, conveyor rolls, and other shapes requiring a reduced section with a heavier wall. In the Westin process, the rotating tube is heated by passing electric current of low voltage and high amperage through the metal walls. The white-hot tube then enters dies which impart to it the desired shape. Surface finish of the completed product is very smooth and free from scale.

Another advantage of the electric heating method is that temperature can be accurately controlled, thus avoiding work hardening and formation of strain flaws. Size and concentricity can be held close, especially where accurate compression-formed tubing is used for the starting piece.

Compression-formed tubing is cold-sized in the same plant by a process in which semi-circular taper-grooved dies are rocked back and forth over the tube, compressing the metal of the tube against a mandrel which controls the inside diameter. Tubes that are sized by the compression process have unusually close tolerances. The dimensions can be so close to those specified that it is often not necessary to do any machining on either the inside or outside of the tube when it is used in the production of ring shaped or cylindrical parts. Since the compression process

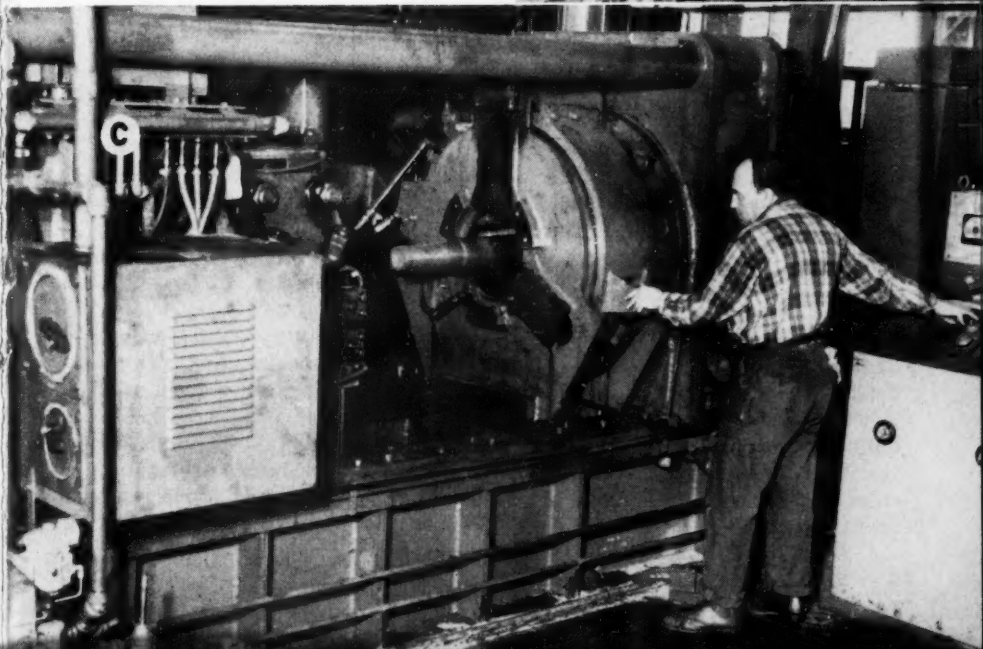
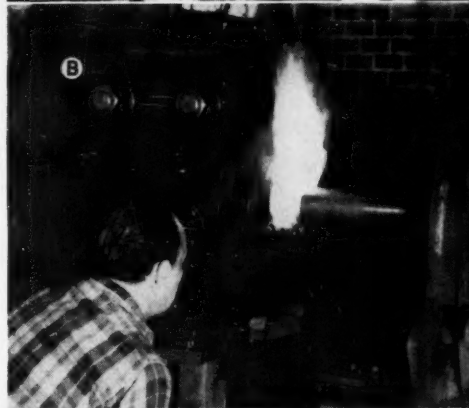
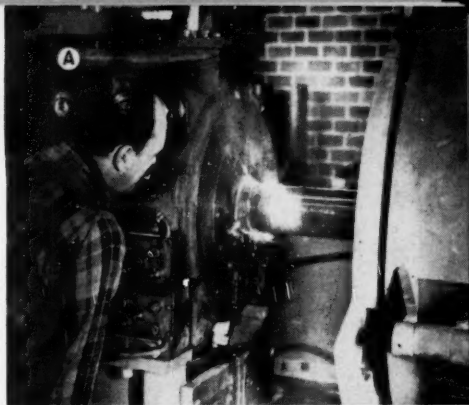


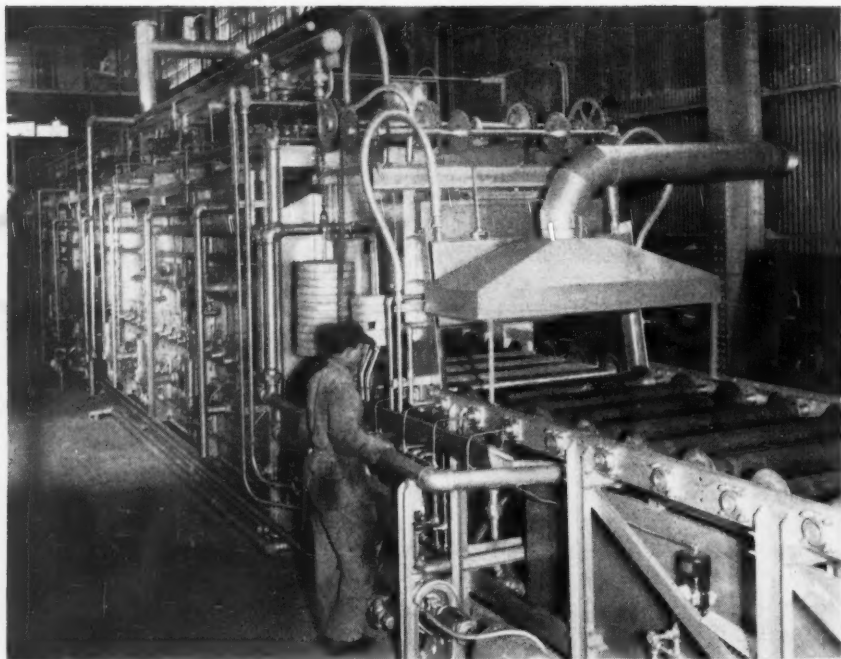
Lubricating tube blank prior to forming

A—Blank being hot-formed in dies of forming machine. B—Formed end of side brace tube as it is removed from dies. C—Finished piece being released from chuck

cold forges the metal in easy stages causing the metal to flow longitudinally and circumferentially, many variables that affect tolerances are eliminated. Thus, homogeneity of the metal is improved and eccentricity of the bore and ovality of the tube are minimized.

The largest of the two new Westin process machines has a capacity to handle tubes up to 10 inches in diameter, while the smaller machine processes tubes up to 5 inches in diameter. Carbon steels, alloy steels, certain stainless steels, 14S and 61S aluminum in a thickness range from 0.050 to 0.250 inch can be formed into spheres or sections with a long radius.





This continuous carbon correction annealing furnace built to specifications of the Union Drawn Steel Division of Republic Steel Corporation and recently installed in the company's Massillon, Ohio, plant is used to both anneal steel bars and restore to the surfaces of the bars carbon burned out by previous hot-working operations.

Continuous Carbon Correction Annealing Furnace Effects Steel Saving at Union Drawn

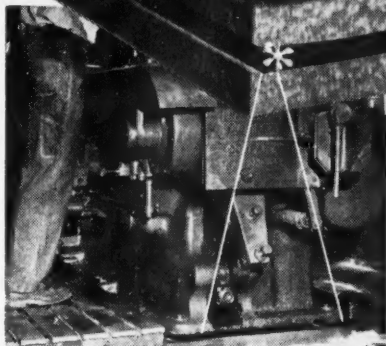
A CONTINUOUS carbon correction annealing furnace installed at the Massillon, Ohio plant of the Union Drawn Steel Division of Republic Steel Corporation is designed to, in one continuous operation, both anneal steel bars and restore to the surfaces of the bars carbon burnt out by previous hot-working operations. The furnace was built and installed by a Toledo firm to specifications drawn by J. D. Armour, chief metallurgist of the Union Drawn Steel Division.

With the previously used method of annealing, carbon was lost from the surfaces of steel bars. This decarburization made the surfaces of the bars too soft for use in many industries, necessitating the removal of the low carbon surfaces by machining or grinding. In the new continuous furnace, atmospheric conditioning units carry gases containing carbon to the annealing furnace. These gases prevent surface carbon lost in annealing and correct any surface decarburization from previous heat-treating operations. By the use of this furnace, it is possible to eliminate grinding or machining operations and to save valuable steel formerly lost in these operations. Bars produced in the

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No Bolts



Almost every kind of machine can be anchored the modern way — on UNISORB . . . on flooring of any type. No bolts. No lag screws. No destructive floor drilling.

A special cement binds the UNISORB pads to the machine feet and the floor with a holding strength of 1500 lbs. per square foot

minimum, which absolutely prevents riding. Besides providing the easiest of all machine installation methods, UNISORB absorbs from 60% to 85% of transmitted vibration and noise. Write for a sample and details now.



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Cylinder blocks are handled at the rate of 100 per hour on this special 13-station machine tool.

furnace are widely used in the farm equipment, automotive, machine tool, hardware, and household appliance industries.

100 Cylinder Blocks per Hour Handled on Special Machine Tool

ONE hundred cylinder blocks per hour are now being drilled, tapped, spotfaced, and reamed on a machine built for an automotive manufacturer by The Cross Co., Detroit 7, Mich. The machine consists of 13 stations, with parts automatically moving from station to station. Only one unskilled operator is required for the operation of the machine.

The operations performed include drilling, centering, and tapping holes in the top and bottom of each cylinder block; chamfering the cylinder bores

to remove all chips from the holes before inspection and tapping. At Station 12, an automatic inspection unit stops the operation of the machine if the holes are not drilled to the proper depth for tapping. A special coolant system is used to flush the taps, and a built-in oscillating type chip conveyor removes all chips.

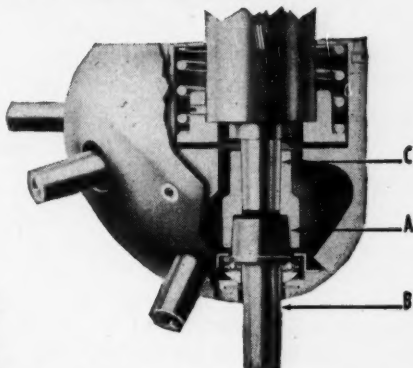
Small Redesign of Cast Steel Hook Effects Large Savings in Production Cost

A 2-LB. piece of steel has replaced a 3½-lb. cast steel plate hook used on more than a dozen models of dough troughs manufactured by the J.H. Day Co., Cincinnati, Ohio, for use in the bakery industry. Even though the redesign itself was a small item, the savings and gain in manufacturing efficiency is highly important because the

top and bottom; drilling oil holes for crank bearings to the oil gallery; drilling, rough boring, semi-finish boring, and spot-facing the distributor shaft hole; and drilling, chamfering, and reaming the dipstick hole. A cleaning unit situated at Station 11 vibrates and rotates the cylinder block 360 degrees

MORE HOLES PER HOUR — PER DOLLAR

Increase production of any standard drilling machine by adding a Lign-o-matic, the only drill turret with the patented, self-centering principle that guarantees sustained accuracy equal to the drilling machine itself.



FOR ALL CONSECUTIVE DRILL PRESS OPERATIONS

PROVED PRODUCTION INCREASE

— Turret indexes faster than tools can be changed or work moved to another spindle. A single Lign-o-matic will release 5 drilling machines for other work and still show increased production and reduced costs on original job.

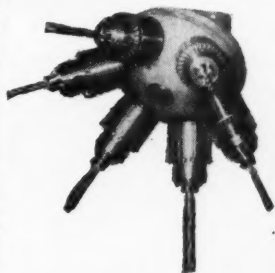
VERSATILITY— Fits any standard drilling machine without altering the machine. Handles operations such as drilling, reaming, counterboring, and tapping (on reversible spindle machines), up to 1/2" diameter in any material.

PRECISION — Patented, self-centering tapered drive (A) automatically locks turret spindle (B) into exact alignment with drilling machine spindle (C) for sustained accuracy.

GUARANTEE — May be returned in 10 days for any reason for full refund of purchase price. Two-year guarantee against defective parts.

PRICE — Model D, 6 spindles with No. 2 Jacobs male taper \$235.00
Chucks extra at established prices.

DELIVERY — Currently, 2 weeks.



☐ Please rush Lign-o-matic turrets for
(drill press make)..... (size).....

(quill dia.)..... (spindle taper).....

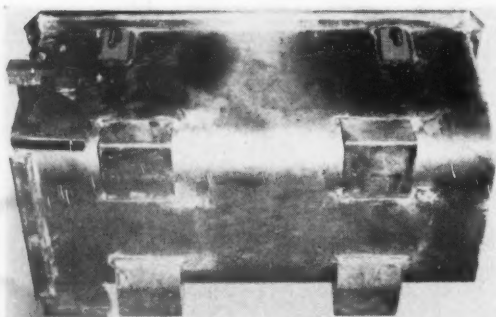
My name.....

Title.....

☐ Please send literature on Lign-o-matic turret.
(Attach coupon to company letterhead)

HOWE & FANT, INC.

527 FLAXHILL RD., SO. NORWALK, CONN.



Welded dough trough to which hooks made from steel plate have been applied by welding. With this design, the cost of the previously used cast steel hooks is saved, as well as the labor of drilling each hook with four holes and punching the trough with 16 holes for rivets, and the expense of the rivets themselves.

hooks are used on so many different sizes of troughs and their holding quality must be beyond question.

The small change in design has resulted in saving the cost of the steel casting, the labor of drilling each one with four holes and punching the trough with 16 holes for rivets, and the expense of the rivets themselves. When the J. H. Day Company decided to

change to welded steel plate and fabricate the part in its own plant instead of purchasing the casting, it was discovered that the steel hook could be made out of shop scrap, which resulted in another saving. In addition, the plant is not now dependent on an outside supplier to deliver the cast steel item, a fact of considerable importance with cast steel currently being in short supply.

(The above item submitted by The Lincoln Electric Company)

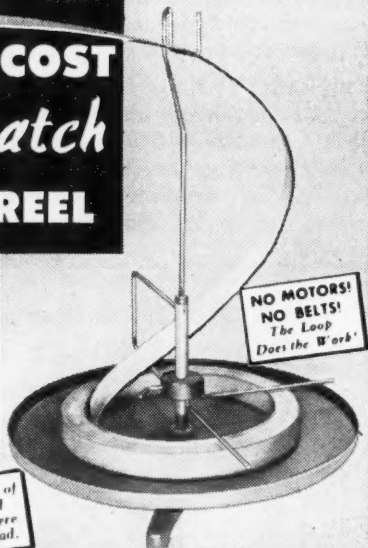
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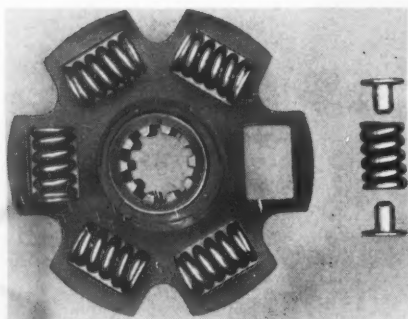


Fig. 1—Clutch plate utilizing six spring-rivet assemblies

Machine Automatically Inserts Springs in Clutch Plate Cavities

FOR automatically inserting springs in cavities of clutch plates, such as shown in Fig. 1, a machine developed by the Klaas Machine & Mfg. Co., Cleveland 25, Ohio, and illustrated in Fig. 2, is used. Separate hoppers contain the springs and the rivets which hold the springs in the cavities. Two rivets are automatically fed to each spring, one rivet being placed in each end of the spring, which is dropped from a separate hopper to make the assembly cycle completely automatic. The assembled springs and rivets are forced into the cavities by means of a hydraulic press. An air-operated

indexing fixture rotates the clutch plate each time a cavity is filled with a spring-rivet assembly.

The machine can be adapted to the assembly of any size clutch plate with varying requirements as to the number of spring assemblies needed. Conveyors are supplied to carry the parts from the bins to the separate hoppers and also to keep the hoppers filled automatically. The particular machine shown is arranged to handle 300 clutch plates per hour with six spring-rivet assemblies to a plate.

For further information on any product mentioned in this issue—use the **READER SERVICE CARD** between the covers.

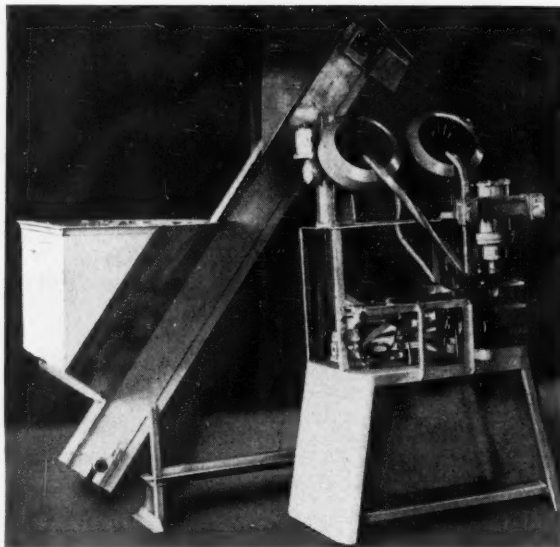


Fig. 2—This particular setup provides for the automatic insertion of spring-rivet assemblies in the cavities of clutch plates, of the type shown in Fig. 1, at a production rate of 300 plates per hour.

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How many man hours are lost every day in your plant because metal components are not properly marked?

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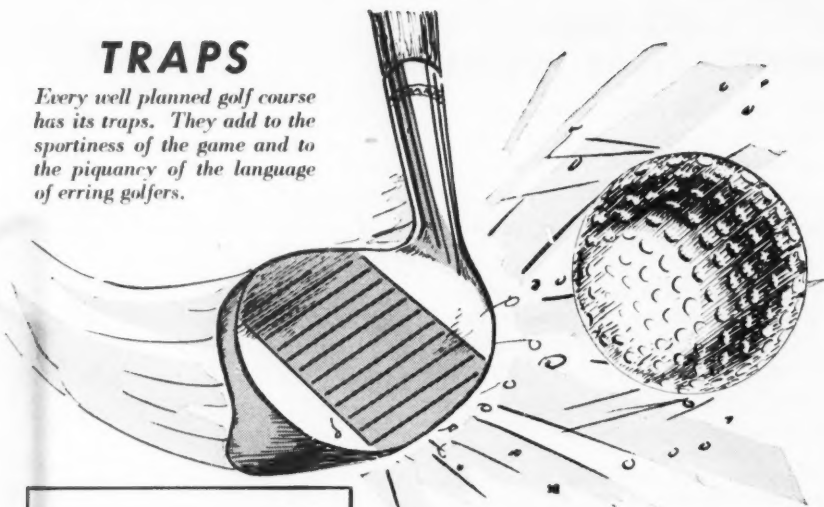


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Ask one of the pros . . . the 20,000 users of Torit Dust Collectors . . . how you can cut strokes off your game, or write for details and latest Torit catalog.

TORIT

Manufacturing Co.

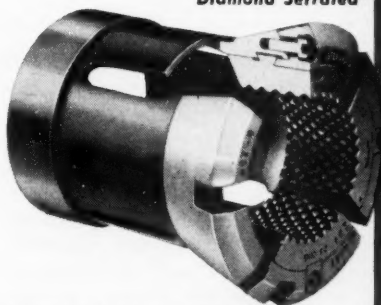
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Change pads
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from machine.

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**MASTER
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Handles all sizes and
shapes of stock within
capacity.

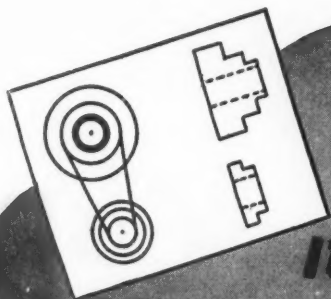
Pads are securely locked by
a greater holding mechanism to prevent
slippage from bar thrust.

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- Standard for all automatic and hand machines

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IDEAS FROM READERS

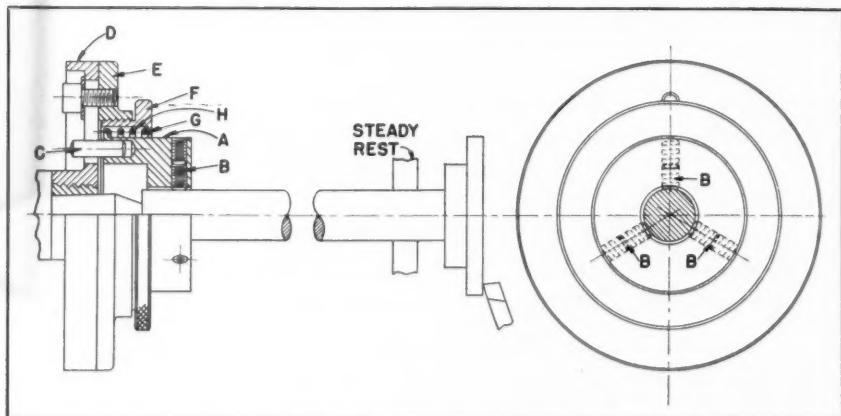
Driving Dog for Steady Rest Work

By F. E. RILEY
England

IN our shop we have the job of finish machining long, slender shaft type parts in precision lathes. One end of a typical part is flange shaped and must be supported in a three-point steady rest while being worked upon by the cutting tools. The other end of the shaft must be supported in a center in the lathe headstock in such a manner

that endwise movement of the shaft is avoided so that the shaft does not become disengaged from the center.

For our particular type of precision work, the means used for driving the work should be capable of handling a wide range of diameters, be reasonably well balanced dynamically, and be adaptable to small lots of repetition work. The work driver which we designed and constructed for the purpose is shown in the accompanying sketch. All parts of the driver are circular in shape so that high speed rotation



Sketch of driving dog for steady rest work

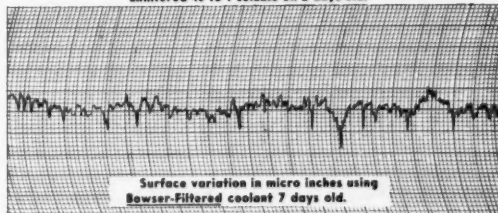
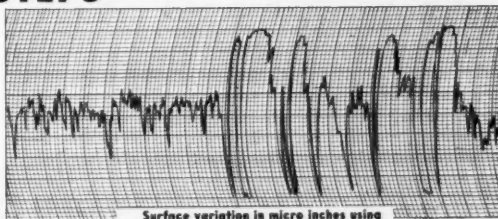
without vibration due to unbalance is assured.

Referring to the sketch, the driving dog **A** is fitted with three accurately spaced gripping screws, **B**, of the socket head set type. When the driving dog is set for a quantity of work, only one of the three screws is adjusted for gripping the part. The remaining pair of screws is locked in place by means of a second screw bearing on the head of each gripping screw. The driving dog is positively rotated by means of the driving pin **C** which has a press fit on one end in the dog, while the other end engages with a slot in the standard driving plate **D** of the lathe.

The main body of the work driver is a housing, **E**, which is bolted to the lathe driving plate. The outside diameter of the housing is equal to that of the driving plate of the lathe, thus eliminating projections which may possibly catch in the sleeve of the lathe operator and cause injury. The housing is threaded internally to accommodate a

threaded sleeve, **F**, which has a shoulder, **G**, at its outer end. Situated between the shoulder **G** and a shoulder on the outside diameter of the work driving dog **A** is a strong compression spring, **H**. When this spring is under compression, it forces the driving dog and the workpiece therein toward the left and holds the centers together with considerable pressure. Clearance is provided between the diameters of

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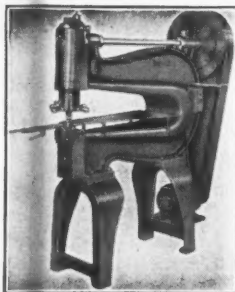
the driving dog and threaded sleeve to permit the centers to readily align themselves.

When it is desired to change parts, the compression of the spring is first relieved by screwing the sleeve **F** outward toward the right. The driving dog screw may then be loosened and the workpiece removed from the dog. A new workpiece is then inserted into the driving dog and pushed into en-

gagement with the center. The driving dog screw is then tightened onto the workpiece and the threaded sleeve screwed toward the left so as to compress the spring and thus hold the centers in alignment with one another and prevent any endwise movement of the workpiece. The free length of the compression spring must be such that it allows the driving dog to be pulled slightly to the right when a new part is inserted and the threaded sleeve is screwed outward almost to the limit of its thread.

The driving dog illustrated herewith is designed for shafts ranging from approximately $\frac{1}{4}$ to 1 inch in diameter.

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CAPACITY
 $\frac{3}{4}$ " MILD
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ASK FOR
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"NIBBLE YOUR COSTS"
FOR TUBE SLOTTING, TUBE SHAPING
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PIONEER MFRS. OF NIBBLING MACHINES

Step-Type Gage Aids in Setting Up End Mill

By IRWIN MANSFIELD

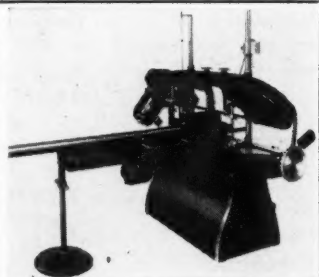
RECENTLY, the writer was confronted with the job of end milling slots to an accurately controlled depth in parts made from various thicknesses of flat stock. During machining, the parts were held on the machine table in a fixture which was designed to readily accommodate the different thickness parts; however, in order to save time by eliminating trial

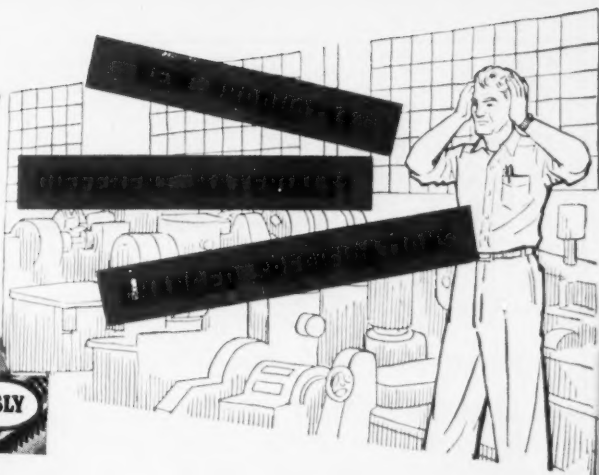
METAL CUTTING SAWS ---built by the pioneers in this field

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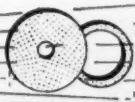
Today's conditions demand many a re-check of tap and drill specifications—because most shops are coming up against new materials . . . using substitute materials . . . or tooling up for unfamiliar work. Besly servicemen, today, are using their wide knowledge of drilling and tapping to extend tool life and help you overcome new and difficult job conditions. Their knowledge begins with tool design and carries through to on-the-job application of the *best* tap and drill for your work . . . whether standard or special. Ask your Besly Distributor to call in the Besly Serviceman to work with you on your "problem" jobs.



TAPS — the
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accurate tap.



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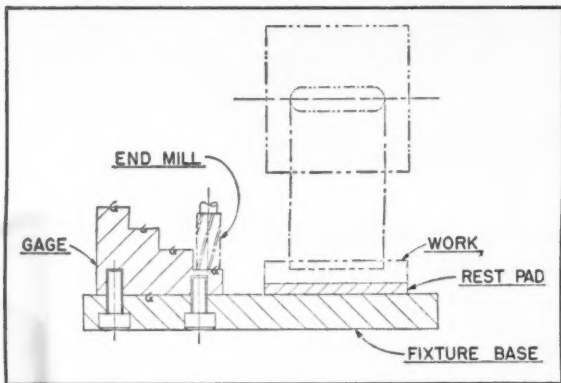
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reduce costs on
every type of
surface grinding.

CHARLES H. BESLY & COMPANY

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Factory: Beloit, Wisconsin

August, 1951

MODERN MACHINE SHOP 211



Sketch showing use of step-type gage in setting end mill for milling slots of controlled depth

and error methods in setting up the end mill for producing the desired depth of slot, the simple gage shown in the accompanying sketch was devised and attached to one end of the work-holding fixture.

As may be readily seen, the gage included a series of steps which served

mill rested on top of the proper step of the gage, as illustrated, and then set his table stops. With such a setup, it was virtually impossible to produce rejected parts.

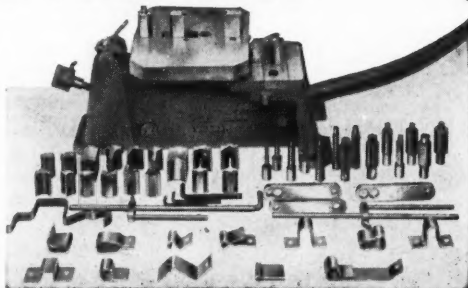
The gage was made of tool steel and hardened and ground on the steps and bottom surface.

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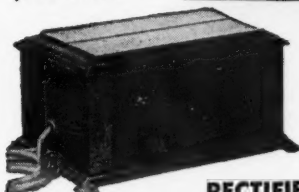
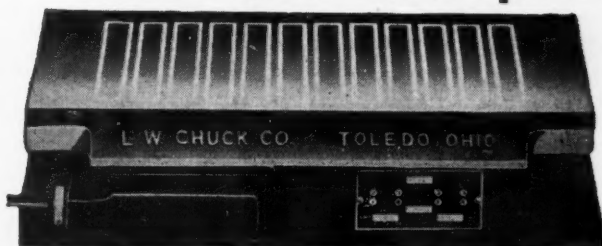
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Ship. wt. 55 lbs. **\$73.45**

Model J-1 for small work, 7 1/4" x 7 1/4" x 6 3/4". Ship. wt. 35 lbs. **\$47.83**

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Automatic Vellum Roller

By GILBERT C. CLOSE

REROLLING blueprint vellums for storage by hand is not only a time-consuming job but results in extreme wear on the edges and corners of the



Vellum roller in use. Note foot pedal switch for operation. After the vellum is rerolled, rubber bands are used to hold it until it is replaced in the storage bin.

print, thus requiring frequent replacement. A simple vellum rerolling machine of the design shown herewith can result in a considerable saving of time and substantial replacement cost reductions in any plant where a number of vellums are employed.

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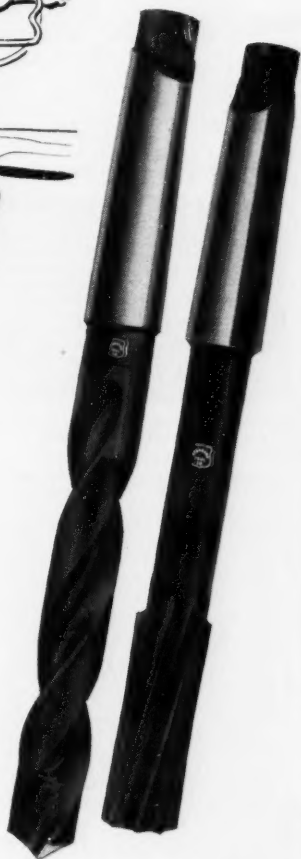


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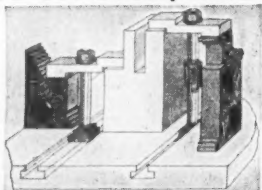
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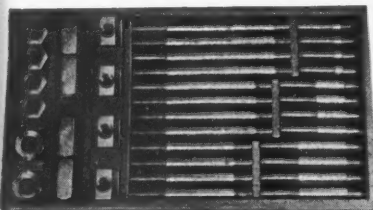
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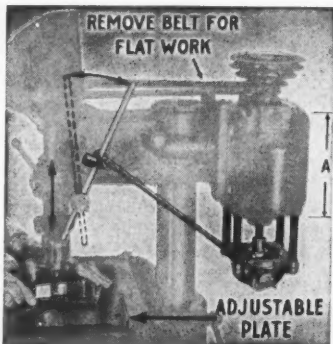


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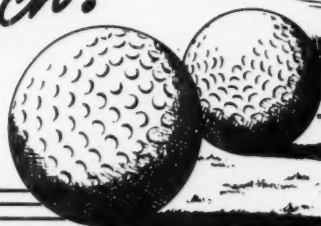
chine is simply a motor-driven spindle containing collapsible spring wires which expand to contact the inner surfaces of the loosely rolled vellum. Friction between these springs and the vellum surface draws the vellum into a



View of mechanism used to drive vellum roller spindle

tight roll for restorage. Because of the tight rolling during storage, a vellum assumes a loosely rolled shape unless forcibly flattened. This loose roll is quickly tightened by the rotating spindle of the vellum roller.

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An Unusual Fixture for Milling a Woodruff Keyway

By ROBERT MAWSON

WITH the modern trend toward standardization, each part used on a complex piece of equipment is designed carefully; and, during the various machining operations which may be required, the part is held to the di-

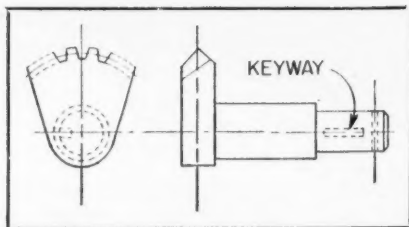



Fig. 1—Drawing of a Rack Bevel Gear Segment Shaft

mensions specified. The result is an accurate part which may either be used interchangeably with other similar parts at assembly or which may be sent out as a replacement part for a machine in the field with the assurance that the proper fit will be obtained.

This article will discuss a fixture which is used when milling a Woodruff keyway in the part shown in Fig. 1. The part is known as a Rack Bevel Gear Segment Shaft; it is made of S.A.E.—X 1335 steel, and it is a detail used on a machine tool built by the Kearney & Trecker Corp., Milwaukee, Wis. The milling of the Woodruff keyway is the final machining operation in the production of the part, and care must be taken to locate this keyway as specified both radially with respect to the gear teeth and longitudinally with respect to the shaft.

The milling fixture is illustrated in



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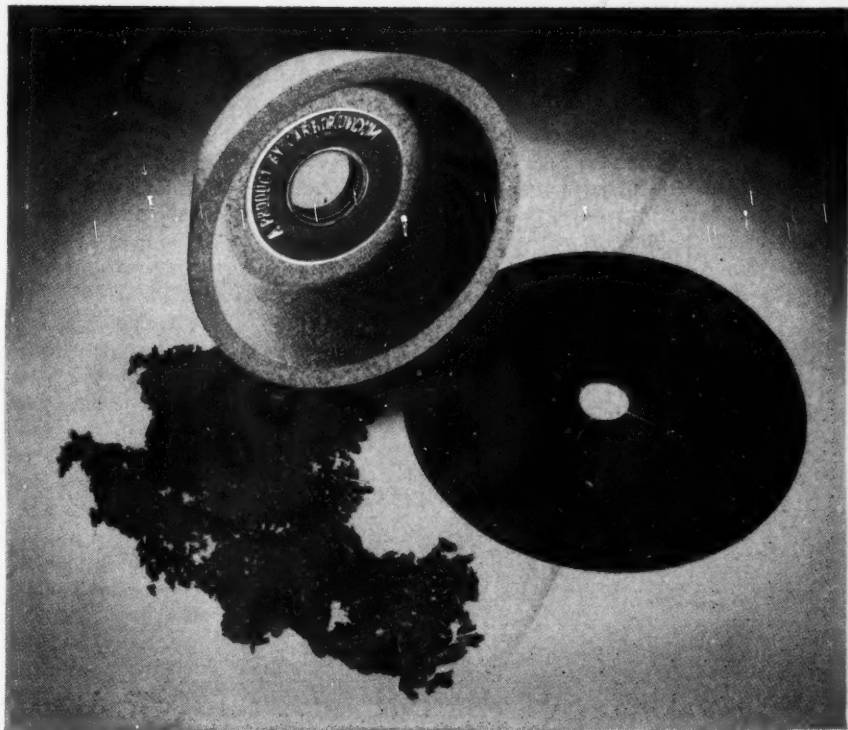
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Fig. 2; a Rack Bevel Gear Segment Shaft is shown in phantom. The fixture is made with a base, **A**, which is machined from a cold rolled steel block. Steps are machined in the base as shown, and two indentations, **B**, are provided at the sides through which bolts are inserted for attachment to the machine table. A groove, **C**, is machined across the bottom of the base; and two steel keys, **D**, are positioned in the groove and held in place by

means of filister head screws. Keys **D** are made to fit into the machine table slot.

Surface **E** on the base is finish ground so that it may be used in locating a 90-degree angle, **F**, which is machined and ground accurately on surface **G**. A $\frac{3}{8}$ -inch diameter hole, **H**, is drilled and reamed in the base perpendicular to surface **E**, and the hole is given a $1\frac{1}{8}$ -inch counterbore for a depth of $\frac{1}{2}$ inch at its lower end. In

this hole is placed a workpiece locator, **I**, which is made from cold rolled steel, case hardened, and then ground on the locating surfaces. The end of the locator which passes through the base into the counterbore is threaded, and a washer and a hex nut are fitted onto this threaded portion to hold the locator in place in the fixture.

Two $5/32$ -inch diameter holes, **J**, are drilled in the base perpendicular to surface **G**; and two holes, **K**, in line with holes **J**, are drilled and tapped with $\frac{3}{16}$ -16 threads. A cold rolled steel, case hardened clamp, **L**, which is used



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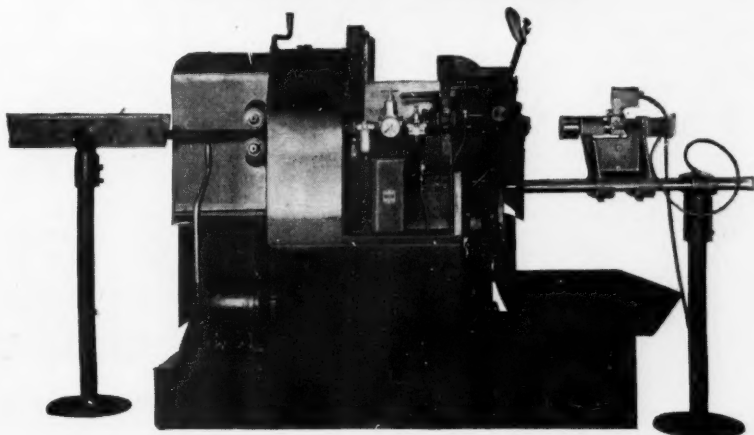
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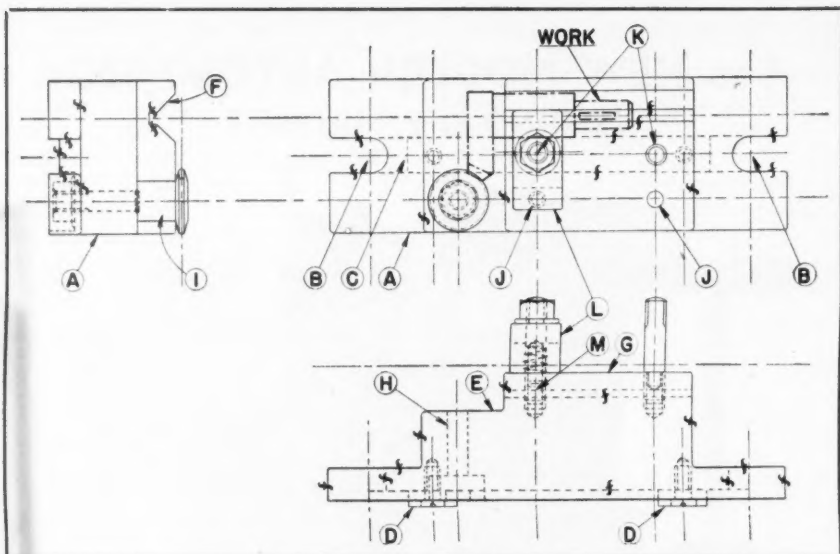


Fig. 2—This illustration shows the fixture designed to be used for milling the Woodruff keyway in the part shown in Fig. 1.

to hold a workpiece in place is positioned over these holes. A cold rolled steel, case hardened stud, **M**, is threaded into hole **K**, a spring is placed over the stud, and then the clamp is placed on the stud. The clamp is rotated until a pin, which is driven into the short side of the clamp and which projects $3/16$ inch beyond the end, is inserted into hole **J**. A washer and a

hex nut are placed on the top of the stud to hold the clamp in place.

To use the milling fixture, the fixture is first placed on the machine table and positioned definitely. Keys **D** are fitted into the table slot, and the nuts are tightened on the T-head bolts which are passed through openings **B**. A Woodruff keyway milling cutter is fastened in the head of the machine

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in the usual manner.

A workpiece to be machined is now placed in the fixture; the shaft is inserted from the left into angle **F** and under clamp **L** with the gear teeth of the segment in a vertical position until the under surface of the geared portion contacts the base. The workpiece is rotated approximately 90 degrees and then moved to the left until the two center gear teeth are held on locater **I**.

When the proper position is obtained, the hex nut at the top of stud **M** is tightened to clamp the workpiece in place.

The machine is started, and the fixture, with the workpiece, is fed against the revolving Woodruff keyway cutter to machine the keyway in the piece. When the machining is completed, the table is moved out of the cutter path, the hex nut on stud **M** is unscrewed,

the workpiece is rotated so that the gear teeth are in a vertical position, and then the finished Rack Bevel Gear Segment Shaft is removed from the fixture.

Two each of holes **J** and **K** are provided for flexibility. If a longer workpiece is to be machined, or if the keyway is positioned differently, another clamp may be located over the second set of holes in order to hold the workpiece in the proper position.

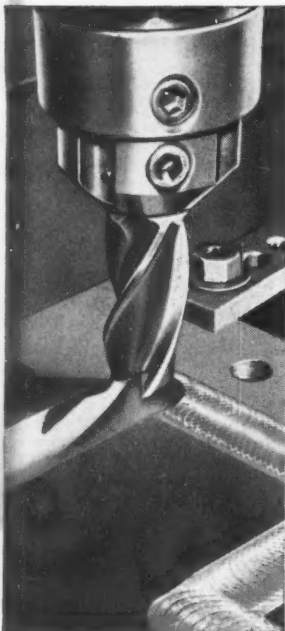
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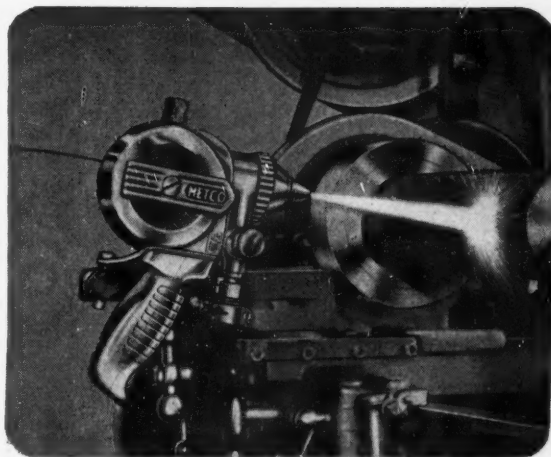
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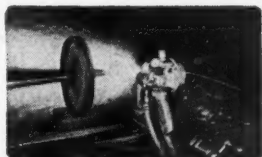
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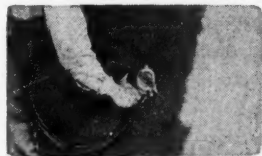
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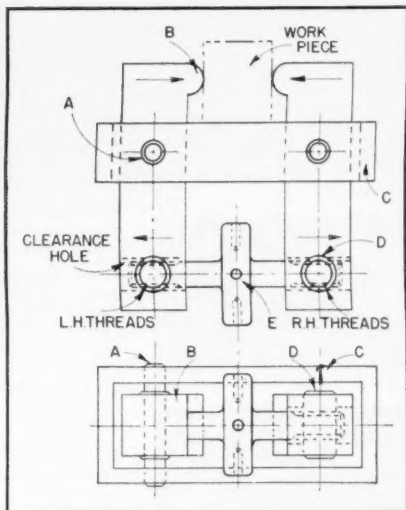
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By F. A. ADAMS

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Sketch of equalizing clamp

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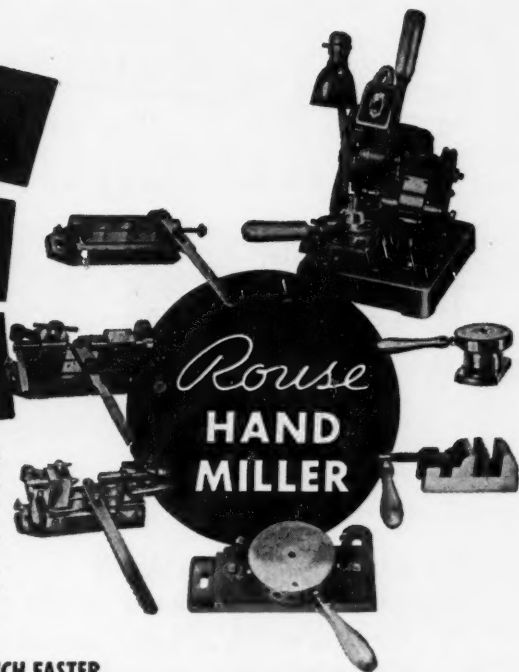
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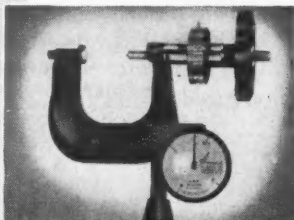
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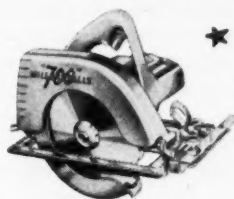
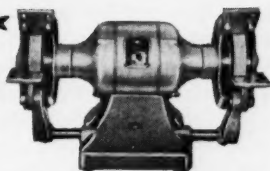


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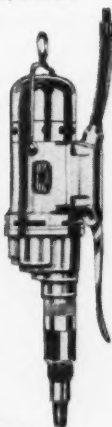
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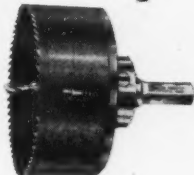
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News of the Industry

Elmes Engineering Division Celebrates 100th Anniversary

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name of Elmes & Son, which continued until the death of the elder Elmes in 1877. From 1877 to 1895 the business was conducted under the name of Charles F. Elmes. Activities then engaged in included the building of steam engines for power plants and the building and maintenance of pumping equipment for the Chicago Waterworks and for engines of the Chicago Fire Department.

Continuous expansion eventually made it necessary to obtain more ample quarters. In 1893, a new and much larger plant was erected in Chicago. In 1895, a corporation was formed known as the Charles F. Elmes Engineering Works with Charles F. Elmes as its president. Upon the latter's death in 1904, the organization was conducted by his sons Charles W. and Carleton L. Elmes. As the volume of business increased, additional build-



Air view of Elmes' present plant at 1150 Tennessee Avenue, Cincinnati, Ohio.
(Inset) The original Elmes foundry, Bath, Maine, 1851.

ings were erected on the Chicago site. Elmes pioneered in the development of many hydraulic equipment products, including presses for producing linseed oil, belting presses, vulcanizing presses, filter presses, and—prominent in the field today—metal-forming presses, plastic-molding presses, wheel presses, and lead extrusion presses.

In 1943, the Charles F. Elmes Engineering Works was purchased by American Steel Foundries and became known as the Elmes Engineering Division of American Steel Foundries. The present Charles F. Elmes, great grandson of the founder, who had served for a number of years as vice president of the Charles F. Elmes Engineering Works, was appointed general manager of the newly established Elmes Engineering Division. In 1949, Elmes moved to its present home in Cincinnati.

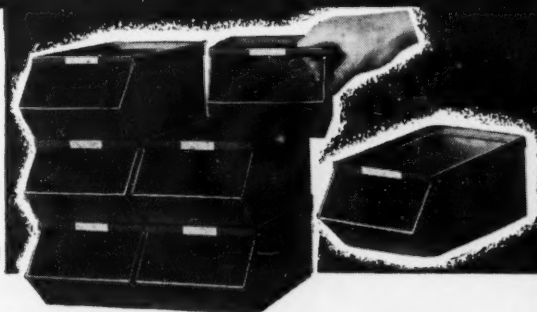
Wendt-Sonis Enlarges and Modernizes Plant

The Wendt-Sonis Co., Hannibal, Mo., manufacturer of carbide-tipped cutting tools, has undertaken an extensive plant expansion program which, according to firm member Alec Sonis, will add 16,200 square feet of working space and approximately double the productive area of the plant, allowing for the installation of new machinery and the employment of a number of additional workers. The entire project, including construction and new equipment, will amount to more than \$300,000.

The enlarged Wendt-Sonis plant is expected to be one of the most modern of its kind—a one-story structure of tile and steel construction covering more than a block. A locally-owned organization, Wendt-Sonis is headed by Alec Sonis, Maurice and Henry Wendt.

Parts...

- ★ Where You Want Them . . .
- ★ When You Want Them



You'll save time, space and labor handling parts and material when you use these patented STACKBINS. STACKBINS keep parts instantly accessible—eliminate waste hand motions—stack compactly to form units of

Manufactured and sold in Canada exclusively by Wickware-Stackbin, Ltd., Ottawa

Write Stackbin Corp., 1083 Main St., Pawtucket, R. I.

exactly the right shape and capacity—make order filling or assembly work faster, easier, more efficient. Heavy steel, all-welded construction. Sizes from 3½"x6"x3¼" to 15"x24"x11". Prices from \$.65 to \$2.75.

STACKBIN



SYSTEM

"Stacked and

Still Accessible"

Kennametal to Construct New Factory Building

Kennametal Inc., Latrobe, Pa., has purchased a 20-acre plot of ground near Bedford and will erect a new factory building of steel and concrete block construction having a floor area of 20,000 square feet. The company will move its mining tool fabricating division to this new site from the main plant to provide room for expansion of facilities for producing "Kentanium,"

the new heat-resistant titanium carbide. One of the largest potential uses for this material is in elements of airplane gas turbines. The company has designed and built a turbine with vital parts made of Kentanium as a service to prospective users. Tests are now being run on this power unit, and demonstrations for the benefit of engine builders are anticipated.

Relocation of the mining tool division is one more step in a long range expansion program,

which involves decentralization of certain basic production facilities. At the Kingston Station metallurgical plant three miles east of Latrobe, raw materials are refined, and the basic carbide powders of tungsten, tantalum, columbium, and titanium are produced. Facilities there have greatly increased during the past year particularly, with additional buildings and new equipment. In the main plant, the carbide powders are processed to form Kennametal "blanks" and then fabricated into complete tools for metal-working, mining, and wear-resistant parts.

Talide

(TUNGSTEN CARBIDE)
**MEETS
EVERY REQUIREMENT**



DIES



BAR STOCK



TOOLS



BLADES



BUSHINGS

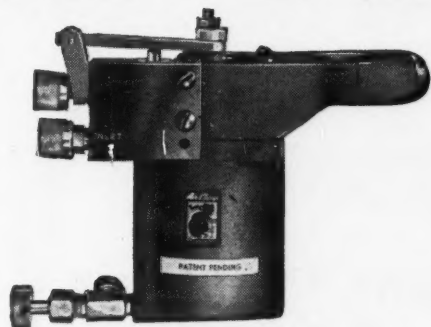


ROLLS

METAL CARBIDES CORPORATION

YOUNGSTOWN 7, OHIO
SINTERED CARBIDES—HOT PRESSED CARBIDES

DOUBLE YOUR DRILL PRESS OUTPUT FOR \$33



USE A NEW MEAD PNEUMATIC DRILL

This simple, inexpensive device quickly converts standard drill presses into semi-automatic machines — increases production substantially on suitable jobs: double or more in some cases.

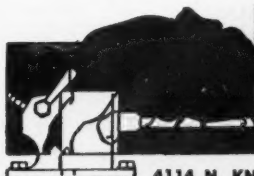
Clamps to spindle quill in a few seconds. Automatically closes air fixture on work. Adjustable feed control and break-through cushion. Quick return. Easy to synchronize with automatic cycle equipment.

*Air-Power does it quicker, cleaner, better.
Write today for latest complete catalog.*

**PRESS
FEED**

for

**DRILLING
REAMING
TAPPING**



MEAD

SPECIALTIES COMPANY

4114 N. KNOX AVE., DEPT. AA-81, CHICAGO 41, ILL.

Tool and Diemaking Course

In response to demands by labor and management representatives for a course of study to be used to train apprentice tool and diemakers in the technical aspects in this important craft, the California State Department of Education has prepared a set of instruction materials to meet this need. Consisting of a workbook containing six major units covering over 50 topics and a test book containing an

objective test for each of these topics, the apprentice course, it is believed, will prove of unusual value to any group attempting to carry on a program in tool and diemaking. Subjects covered are tools, jigs, and fixtures; gages; punch press dies; forging dies; die-casting dies; and plastic dies. Each of these sections was prepared by an expert craftsman in his special field.

Persons interested in obtaining copies

of the tool and diemaking course may do so by writing to the California State Department of Education, Bureau of Textbooks and Publications, Library-Courts Building, Sacramento 14, California. The price of the Tool and Diemaking Workbook is \$2.00; the Tool and Diemaking Testbook is \$2.00; and the Final Examination is 15 cents. California sales tax must accompany orders from the State of California. Charge account purchase orders can be accepted from public institutions; orders from all other sources must be accompanied by check or money order.

**Why use a
SLEDGE HAMMER
to drive a tack?**



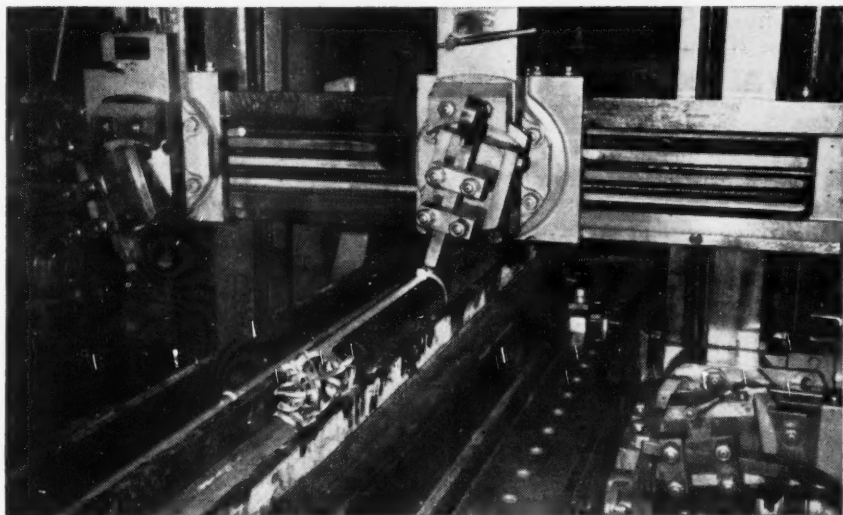
Write for free
circulars.

**IDEAL for all
low-tonnage
requirements
and assembly
operations.**

**1 TON Midget
Benchmaster
Other models
Available**

**1 benchmaster PUNCH PRESSES
AND MILLERS**

2952 West Pico Boulevard, Los Angeles 6, California



PRACTICAL DEMONSTRATION OF POWER

Walker Chuck, without supporting back rest, holds tremendous pressure.

Walker Chucks

save setup time, eliminate need for costly and time-consuming clamps and work-holding fixtures.

Walker Chucks

Also Permanent Type now available in the following sizes:

RECTANGULAR			SWIVEL	ROTARY
4" x 8"	6" x 18"	10" x 15"	4" x 8"	4" 12"
5" x 10"	8" x 18"	10" x 24"	6" x 18"	6" 14"
6" x 12"	8" x 24"	12" x 24"	8" x 24"	9" 16"
				10"

Hold Everything with Walker Chucks

O. S. WALKER CO. Inc.

WORCESTER 6, MASSACHUSETTS

Original Designers and Builders of Magnetic Chucks

Warner & Swasey Receives N.I.A.A. Award

An advertising campaign devoted to helping manufacturers make better use of machine tools already in their shops brought the Warner & Swasey Co., Cleveland, Ohio, an award in the National Industrial Advertisers Association's annual competition for outstanding achievements. The award was announced in New York, where the

association held its annual convention, and cited the effectiveness of Warner & Swasey's campaign to "hold existing markets in time of shortages."



J. E. Craig

The ads, which ran in 10 leading business papers, were developed under the direction of J. E. Craig, Warner & Swasey's advertising manager, by the Griswold-Eshleman Company. They pointed out that there is no priority on the service of Warner & Swasey field engineers, who are available to help machine tool owners obtain more production from their Warner & Swasey equipment. A number of Warner & Swasey publications on tooling and turret lathe operations were featured in the series, which involved commitments for advertising space costing a total of more than \$90,000.



**STANDARD
D - 4
Abrasive
Band Grinder**

Famous
for
Stamina

This new, streamlined bench type grinder, assures fast, quality finishing on metals, plastics, wood, fibre... at low cost. Built to machine tool specifications, Standard D-4 is equipped with improved band tension control and specially designed protective motor hood. 4x36 $\frac{1}{4}$ " band. The ideal portable unit.

OTHER STYLES AND SIZES IN NEW
MANUAL ON FINISHING—WRITE TODAY

WALLS SALES CORP.

333 Nassau Avenue, Brooklyn 22, N. Y.

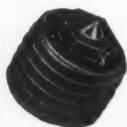
Skilsaw's Los Angeles Branch Moves to New Location

Paul Watts, vice president in charge of sales for Skilsaw, Inc., Chicago, Ill., manufacturer of portable power tools, has announced the moving of Skilsaw's



A REAL HELPING HAND

It's a help that die makers, tool makers, machinery builders and general machinists have long sought—a more accurate and surprisingly faster way of transferring blind screw holes.



The Heimann Transfer Screw Set is a self-contained complete tool. No wrenches or pliers are necessary. Made in $\frac{7}{8}$ " to 1" diameters. Send for price list.

HEIMANN MFG. CO.

330 LINCOLN AVE.

URBANA, OHIO



Neat trick for cutting oil !

You'll realize how Houghton Antisept puts "money in the bank" as soon as you start using it. Your machinists mix as much as 30 parts of plain water to one part of this all-purpose base. It will cover better than 90% of your metal-cutting jobs.

Use Antisept for general machine work . . . for automatics . . . for stamping and forming. You handle *one* instead of many cutting oils. You save space, write smaller inventories, simplify selection!

Throughout industry users are reporting good examples of Antisept's cost-cutting benefits . . .

A midwest metalworking plant reduced cutting fluid costs from 35¢ to 7½¢ per gallon . . . a well-known N.Y. manufacturer is cutting coolant costs 75% . . . a Pennsylvania plant operator reports better results at less than 1/3 of their previous oil costs . . . to mention just a few of many actual cases.

Why don't you ask the Houghton man to arrange a convincing test on your tough machining operations? Or if you prefer further information in advance, write to E. F. Houghton & Co., Philadelphia 33, Pa.

ANTISEPT

ALL-PURPOSE BASE
HIGH IN ANTIWELDING PROPERTIES AND
FATTY CONTENT

LATEST BULLETIN

on Houghton Antisept—showing its versatile applications—will be mailed on request.

E. F. HOUGHTON & CO.
PHILADELPHIA • CHICAGO • DETROIT • SAN FRANCISCO



**Ready to give you
on-the-job service . . .**



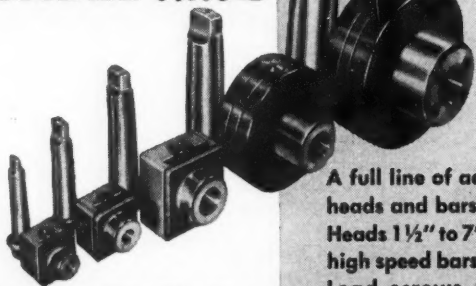
New headquarters of Skil's Los Angeles Branch

Los Angeles branch to a new location in the city. Formerly at 2645 S. Santa Fe Avenue, the branch is now located at 2730 South Broadway, Los Angeles 7, occupying new modern quarters with a total floor space of 5,500 square feet.

According to Mr. Watts, the move was necessitated by the increased demand for Skil portable power tools in

the area, which resulted in a need for expanded on-the-spot factory branch service. The larger size of the new branch headquarters provides for the stocking of a complete line of replacement parts for all Skil tools, the availability of factory trained service mechanics, and ample demonstration and display space.

*for greater RIGIDITY
more ACCURATE cuts*



use
CRITERION

CRITERION
machine
WORKS

**BORING
HEADS**

A full line of adjustable boring heads and bars now available. Heads 1½" to 7" dia. Carbide or high speed bars ¾" to 1¼" dia. Lead screws ground AFTER HARDENING. Ample bearing surface, heat treated parts, interchangeable shanks. Criterion tools are the criterion. Write for free catalog and costs.

9312 SANTA MONICA BLVD. • BEVERLY HILLS, CALIF.

IT'S A *Mac-it*[®]

PRONOUNCED
"MACK-IT"

Mac-it Stripper Bolts—heat-treated
for strength, head concentric with
body, ground to close tolerances.



BUILT FOR STRENGTH!

For the toughest kind of fastening jobs, the complete Mac-it line of heat-treated, alloy steel screws will give you the strength you need *where you need it!*

Mac-it's 38 years' experience in the manufacture of these top-quality fasteners is your assurance of precision, uniformity and strength. Sold through leading industrial distributors from coast to coast and in Canada.

Other Mac-it products include:

Hollow Lock Screws
Socket Head Cap Screws
Hollow Set Screws
Hollow Pipe Plugs

Socket Screw Keys
Square Head Set Screws
Hexagon Head Cap Screws
... and many others

Marketed Nationally Since 1913 by

STRONG, CARLISLE & HAMMOND COMPANY
Cleveland 13, Ohio

Manufactured by MAC-IT PARTS COMPANY, Lancaster, Pa.

J. M. Dolan Appointed to H-P-M Board

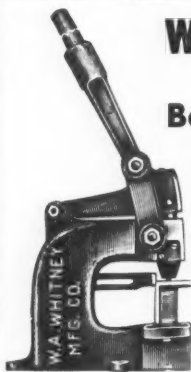
G. B. Robinson, chairman of the board, The Hydraulic Press Mfg. Co., Mount Gilead, Ohio, has announced the appointment of John M. Dolan, vice president and general sales manager, to the company's board of directors. In addition to Mr. Dolan, board members are John C. Cotner, president; J. A. Herbert; L. K. Newell; G. B. Rob-

inson, chairman; Henry R. Talmage; W. G. Tucker; and F. J. Wright.

Mr. Dolan joined the firm in 1948 with a background of more than 20 years of experience in the heavy machinery, engineering, sales, and administrative fields. He currently heads all distribution and service operations of the 74-year-old firm which specializes in hydraulics and hydraulic press equipment.



John M. Dolan



WHITNEY No. 91 Bench Punch

A very efficient and satisfactory tool for general use, shop or experimental room.

Depth of throat — 5 inches.

Capacity — $\frac{1}{2}$ thru $\frac{1}{4}$ or 2 thru $\frac{1}{8}$ ".

Notches angles $1\frac{1}{2} \times 1\frac{1}{2} \times \frac{1}{8}$.

Punches supplied in rounds, squares, ovals, rectangles or specials.

Write for catalogue.

W. A. Whitney Mfg. Co.

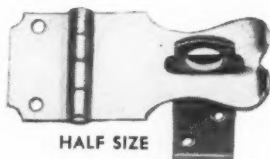
640 Race St.

Rockford, Ill.

Crane Packing Company Begins Construction of New Plant

Construction of new general offices and plant facilities for the Crane Packing Company of Chicago is now underway, according to an announcement made by Frank E. Payne, company president. For over 40 years, the company has been one of the world's largest manufacturers of industrial packings, mechanical seals, and oil seals and, more recently, has been engaged in producing the "John Crane" Lapmaster, a precision lapping machine.

The new plant site, situated on Oak-



HALF SIZE

HASP & STAPLE

S & S HINGE AND METAL PRODUCTS CO.

4725-4735 IOWA ST.

DEPT. M

CHICAGO 51, ILLINOIS



WITH OR WITHOUT HOLES

Butts and Continuous Hinges for Cabinets, Cases, etc.



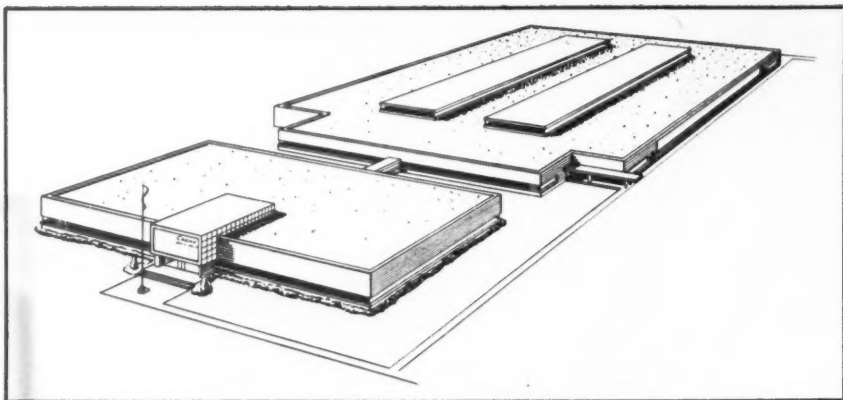
On nearby shelves
of industrial sup-
ply distributors

BAY STATE TAP & DIE CO.

Mansfield, Mass.

August, 1951

MODERN MACHINE SHOP 241



Architectural sketch of new plant of Crane Packing Co., Morton Grove, Illinois

ton Avenue near Lehigh in Morton Grove, Ill., will cover 133,000 square feet when completed. According to Mr. Payne, the new plant will enable the company to increase the production of

high quality packings and seals to meet the demands of today's severe requirements in the wide range of temperatures, speeds, and services for national defense.

THOSE "OCTOPUS" FURNACE DAYS ARE GOING!

MEET JUMPIN' GIBBERIN' J.G. BROWN—THOSE ATMOSPHERE FURNACES GOT HIM DOWN—



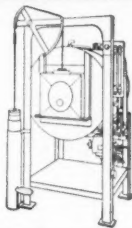
DELAWARE TOOL STEEL CORP.

WILMINGTON 99, DELAWARE

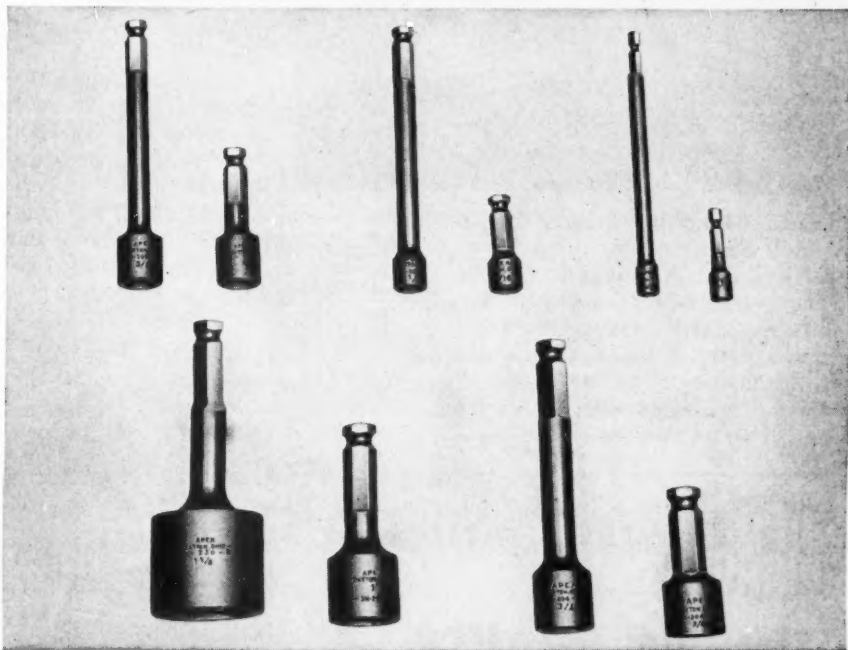


NOW A DELAWARE FURNACE WITH SIMPLE CONTROLS—DOES EVERY JOB WELL AND TOOL PRODUCTION ROLLS!

Get the FACTS on the simple DELAWARE Controlled Atmosphere Furnace. One furnace does every heat treating job on every type of tool and alloy steel. No scale... No decarburization... No hokus pokus. Send for Bulletin F-1.



For increased torque...specify **APEX SN NUT SETTERS**



Power—applied straight from gun to work—that's the way Apex SN nut setters develop greater torque . . . permit faster, safer operation . . . help lower production costs.

These precision-built, one-piece tools have no movable parts, joints or locking devices to cause excessive torque loss, backlash or vibration. Easier on tools and operators.

Apex SN Series nut setters are available with $\frac{1}{4}$ ", $\frac{5}{16}$ ", $\frac{7}{16}$ ", $\frac{5}{8}$ " and $\frac{3}{4}$ " hex drives . . . broached hex openings, $\frac{1}{4}$ " to $1\frac{1}{4}$ ". . . broached square openings, $\frac{1}{4}$ " to $\frac{3}{4}$ ". Complete information on Apex SN nut setters and other money-saving Apex production tools is available in Catalog 29. Write, on your company letterhead please, for your copy.

APEX TOOLS

sockets, extensions, adapters

THE APEX MACHINE & TOOL COMPANY

1027 S. Patterson Blvd. • Dayton 2, Ohio

Safety Friction Tapping Chucks • Vertical Float Tapping Chucks • Self-Releasing and Adjustable Stud Setters
Power Bits for Phillips, Frearson, Slotted Head, Clutch Head, Hex Head and Socket Screws • Hand Drivers
for Phillips, Frearson and Clutch Head Screws • Aircraft and Industrial Universal Joints • Sockets and Universal Joint Socket Wrenches.

August, 1951

MODERN MACHINE SHOP 243



New multi-roll shrinking machine installed by The Felters Company for the making of felt

Felters Company Installs Multi-Roll Shrinking Machine for Felt Production

The Felters Co., 210 South St., Boston 11, Mass., one of the world's largest manufacturers of felt, has announced the installation of a new multi-roll shrinking machine with which the company states they are developing an

entirely new theory and process for the making of felt. Fabricated in Italy, the machine is the result of progressive studies by German, Italian, French, and American machine makers going back to the turn of the Twentieth Century. The installed unit cost of the new shrinking machine is said to be in the neighborhood of \$70,000.

L. F. R. Bellows Dies

L. F. R. Bellows, president of The Bellows Company, manufacturer of pneumatic equipment, and The Bellows

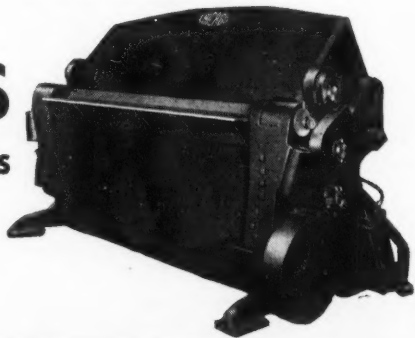


STEEL HAND and POWER

BENDING BRAKES

for Single and Quantity Runs

BENDING STEEL PLATE
and SHEET METAL



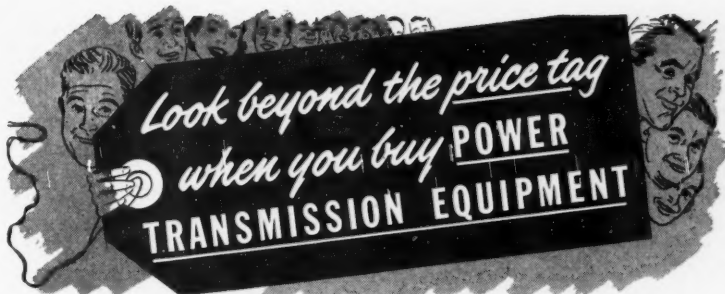
Special Bending Brakes
Double Folder Brakes

DREIS & KRUMP

MANUFACTURING COMPANY

7418 S. Loomis Boulevard, Chicago 36, Illinois





"SAVED": \$7.82 by buying a cheaply made speed reducer
LOST: \$164.18, including a whole tankful of valuable chemicals



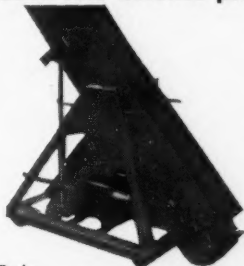
BOSTON REDUCTOR

Cost	\$206.60
Cost of inferior speed reducer	\$198.78
Difference in cost	\$ 7.82
Value of spoiled chemicals	\$100.00
Cost of disassembly and replacement (2 men, 3 hrs., @ \$2.00 per hr.)	\$ 12.00
Loss of profit and overhead on 3 hours production	\$ 60.00
NET LOSS	\$164.18

"SAVED": \$5.70 by buying a cut price motorized speed reducer
LOST: \$155.90 worth of time, labor and defense production

BOSTON RATIONMOTOR

Cost	\$140.50
Cost of "bargain counter" motorized speed reducer	\$134.80
Difference in cost	\$ 5.70
Cost of pulling down conveyor and replacing defective speed reducer (2 men, 4 hrs., @ \$2.25 per hr.)	\$ 18.00
Cost of toting parts while conveyor was idle (6 men, 6 hrs., @ \$1.35 per hr.)	\$ 48.60
Loss of profit and overhead	\$ 95.00
NET LOSS	\$155.90



The hidden quality in BOSTON Reductors and Rationmotors stems from BOSTON Gear's strict materials control, master craftsmanship and rigid inspection system, backed by 71 years of experience in the manufacture of standardized, interchangeable, stock power transmission equipment and parts.

Specify Standardized BOSTON Gear Products — Design them into your equipment — Get them from nearby stock.

Write for Catalog 35. It contains a wealth of useful data and selection charts.

BOSTON GEAR WORKS

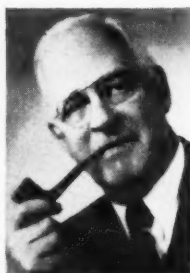
68 HAYWARD ST., QUINCY 71, MASS.



Electric Sign Corporation, both of Akron, Ohio, died recently in Detroit, Michigan, at the age of 69. Mr. Bellows founded Bellows & Company to manufacture electric signs in Detroit in 1911. In 1925, his company was the first to introduce and develop neon signs in the Middle West.

Early in 1940, Mr. Bellows became interested in pneumatics and, with Herbert B. Link of Akron, organized

The Bellows Company to manufacture and distribute pneumatic devices. The company has since grown to be one of the largest of its kind in the United States with plants in Akron, Ohio; Warsaw, Indiana; Detroit, Michigan; and Los Angeles, California. Mr. Bellows was the inventor of the Electro-
 aire air control valve, an electrically controlled valve which utilizes the air it controls to operate the valve.



L. F. R. Bellows

**...for more than
1001 jobs**

HJORTH LATHE & TOOL CO.
8 BEACON STREET WOBURN, MASS.

**RECLINABLE
POWER PRESSES**

Ideal for general stamping work . . . 4 to 100 tons capacity. Can recline to 40° with perfect safety.

Our catalog contains a wide variety of press types and sizes. Write for it today.

*46th year serving worldwide industry with Patent Percussion, Open Back, Double Crank, Punch, Horn, and Toggle and Straight Side Presses, Dial and Roll Feeds.

ZEH & HAHNEMANN CO.
190 VANDERPOOL ST., NEWARK 5, N. J.

George A. Ingalls Elected Vice President of AMF

George A. Ingalls, a director and comptroller of American Machine & Foundry Co., New York, N. Y., has been elected a vice president, according to an announcement made by Daniel H. Haynes, vice chairman of AMF's board of directors. He will continue as company comptroller.

Mr. Ingalls, elected to the board of directors in February 1950, has been comptroller of American Machine & Foundry Company since January 1, 1946 and has been associated with AMF

**READING BENCH
KEYSEATER**

Portable — move directly to job; a time saver for both small and large shops.

3 1/2" stroke; adaptable for other work.

Low first cost — prompt delivery.

Good dealers wanted.

READING MACHINE CO.
READING (Cincinnati) OHIO

Operation "KELLERING"

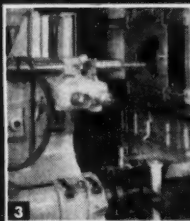
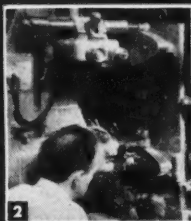
(AS APPLIED TO AIRCRAFT PRODUCTION)

KELLERING is the sure way to keep pace with urgent demands for accurate prototypes in metal — without the need and expense of preliminary forging dies.



The versatility of **KELLERING** — fast, accurate, automatic, tracer-controlled milling at its economical best — speeds the machining of all kinds of models, molds, patterns, tools and complex parts, either singly, in short run lots, or in quantity production. Defense plants look to **KELLERING** for profiling any material in 2 dimensions . . . or form milling in 3 dimensions . . . from any master form . . . to any contour. It pays to inquire about **KELLERING** at your nearby Pratt & Whitney Branch Office.

P&W BL KELLER MACHINE
Two Sizes: 24 x 16 and 36 x 20



PRATT & WHITNEY

Division Wiles-Bement-Ford Company
WEST HARTFORD 1, CONNECTICUT



KELLERING
of forged steel
aircraft landing
gear yokes.

KELLERING
complex con-
tours of magne-
sium aircraft
wing fittings.

KELLERING
inside contours
of forged steel
aircraft cata-
pult hooks.

KELLERING
steel prototype
of aircraft land-
ing gear cyl-
inder.

KELLER MACHINES

for the economical production of
parts for prototypes and pilot models



George A. Ingalls

since July 1919. He is a member of the board of directors of several AMF subsidiaries, including DeWalt, Inc., Lancaster, Pa.; Union Machinery, Joliet, Ill.; and Transducer Corp., Boston, Mass. He is also a vice president of Union Machinery and comptroller of the AMF affiliate, International Cigar Machinery Company.

R. S. Cooper Elected President of The E. Horton and Son Company

The board of directors of The E. Horton & Son Co., Windsor Locks, Conn., has announced the election of

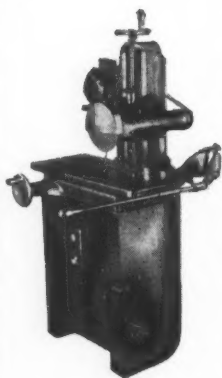
R. S. Cooper as president of the chuck manufacturing firm. D. B. Huntting, former president, has been elected board chairman.

Mr. Cooper, one of the co-founders of The Gabb Mfg. Co., Inc., East Hartford, Conn., became vice president of The E. Horton & Son Company in charge of The Gabb Special Products Division in July 1949 when the two companies merged. Mr. Cooper has an excellent background in the manufacturing industry and is also well-known in the aircraft industry, having been instrumental in the development of several aircraft maintenance tools and



R. S. Cooper

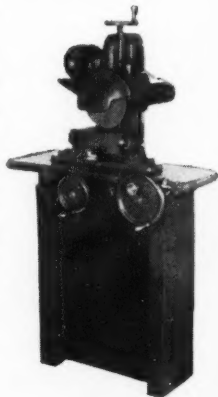
PRODUCTION JUMPER



"T" SURFACE GRINDER

Crosman's hand operated "T" Grinder and No. 20 Chaser Grinder ups production, puts money in your pocket. The "T" Grinder though small in size takes big jobs in its stride—grinds dies, tools and parts up to 4" wide, 8" long and 10" high with accuracy and excellent finish. The No. 20 Chaser Grinder accurately resharps Chasers—both on the chamfer and cutting face.

Send for Bulletin



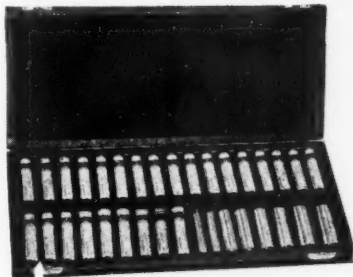
#20 CHASER GRINDER

J. B. CROSMAN & SON, INC., EAST WALPOLE • MASS.

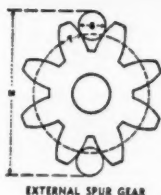
ACCURACY the EASY WAY...

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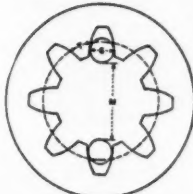
Van Keuren GEAR MEASURING SYSTEM Spurs, Helicals, Splines, Serrations



Set No. 26 EX, External Gear Measuring Wires, \$140.00.



EXTERNAL SPUR GEAR



INTERNAL SPUR GEAR



SIMPLE

RELIABLE

ACCURATE

THE Van Keuren Gear Measuring System is generally accepted as the easiest and most accurate method of checking tooth thickness of gears, 30° involute splines and 90° involute serrations. A measurement is made over two opposing wires and this actual measurement is compared with the theoretical measurement over wires for a perfect gear as computed from the Van Keuren tables for 1 diametral pitch gears.

The only equipment required is a set of 2 wires of the proper size for each diametral pitch.

Standard sizes of wires available from stock are:—

1.728"
DP for external spurs and helicals.

1.44"
DP for internal spurs and splines.

1.92"
DP for enlarged pinions, 30° involute splines and 90° involute serrations.

1.68"
DP Alternate series for special requirements.

For spur gears, involute splines and serrations, the only calculation is one of simple division. For helical gears use the simplified computation forms VK-103, VK-104 or VK-105.

The 1.728"/DP System is used by over 90% of American gear producers and users. The 1.44"/DP and 1.92"/DP systems have been incorporated in standards for involute splines and serrations.

The Van Keuren Gear Tables are complete for gears from 5 to 500 teeth and for pressure angles of 14½°, 17½°, 20°, 25° and 30°. If the measurement over the wires is greater than the value calculated from the tables, the tooth is too thick and the cutter must be fed further into the gear blank. Constants for controlling tooth thickness and backlash to .0001" are given for all pressure angles.

VAN KEUREN CATALOG AND HANDBOOK NO. 34

This 208 page volume represents two years of research sponsored by the Van Keuren Co.

It presents for the first time in history a simple and exact method of measuring screws and worms with wires.

It tells how to measure gears, splines and involute serrations. It is an accepted reference book for measuring problems and methods.

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THE *Van Keuren* **CO.,** 175 WALTHAM STREET, WATERTOWN, MASS.

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Light Wave Equipment • Light Wave Micrometers • Gage Blocks •
Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires •
Thread Measuring Wires • Gear Measuring System • Shop Triangles •
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accessories. He has also applied his experience and ingenuity in the power equipment field. Most recent of Mr. Cooper's developments is the Moto-roller, a ½-ton water ballast general utility power roller currently being manufactured by The Gabb Special Products Division.

Maker of Doerr Motors Changes Name

To prevent confusion in the trade between the name Electro Machines, Incorporated, and several similar firm names and to better identify name with product, the manufacturer of Doerr electric motors has officially changed the company name to Doerr Electric Corporation. According to Lee A. Doerr, president, there will be no change in ownership, management, policies, or personnel.

Norton Executive Elected President of A.S.M.M.A.

Ralph M. Johnson, vice president in charge of sales for the Norton Co., Worcester, Mass. was elected president of the American Supply and Machinery Manufacturers Association at the opening of its three-day convention held recently in San Francisco. Mr. Johnson has been active in the organization for five years, having served successively as second and first vice president. The association's meeting was held in conjunction with the National Supply and Machinery Dis-



Ralph M. Johnson

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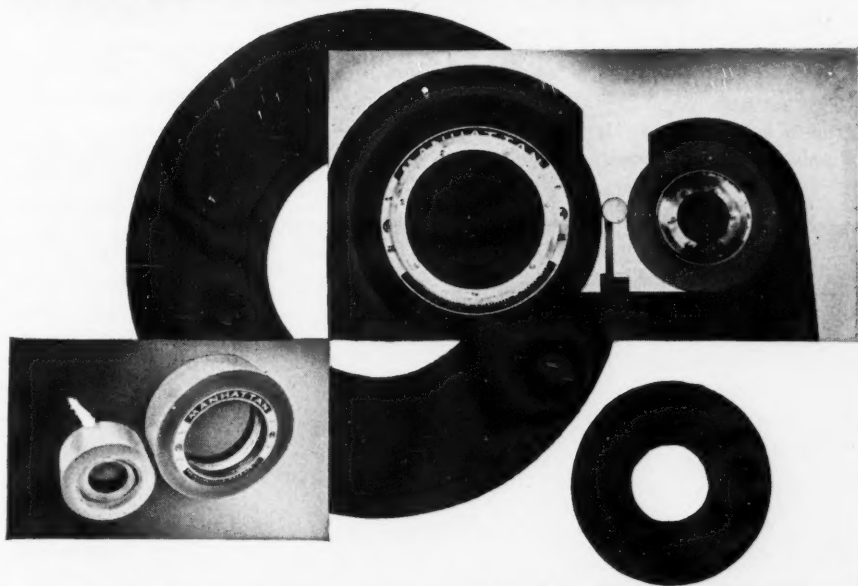
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Your hardness tester is useful only when you are sure it is giving you accurate, dependable readings. You can rely on the accuracy of your hardness tester when you check it regularly with CLARK standard test blocks. Clark test blocks, in various hardness grades, provide a quick, sure, and simple method of assuring accurate hardness tester readings.

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tributors Association and the Southern Supply and Machinery Distributors Association.

National Conference on Industrial Hydraulics

The seventh annual National Conference on Industrial Hydraulics will be held November 8 and 9 in the Sher-

man Hotel in Chicago, according to an announcement made by conference director John J. Slomer, Goodman Manufacturing Company, Chicago. The two-day meeting will be devoted to a presentation of topical, technical papers by authoritative speakers on the latest developments in the industrial hydraulics field.

Sponsors of the non-profit, non-commercial meeting

are the Graduate School of the Illinois Institute of Technology and Armour Research Foundation of Illinois Institute of Technology. Cooperating societies are the local sections and chapters of American Society of Civil Engineers, American Society of Mechanical Engineers, Society of Automotive Engineers, American Society of Lubricating Engineers, American Institute of Chemical Engineers, Institute of Aeronautical Sciences, American Society of Agricultural Engineers, Illinois Society of Professional Engineers and Western Society of Engineers.



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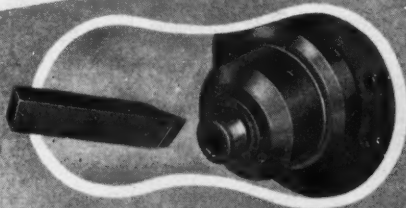
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Brick, glass, and aluminum entrance portal to The Lincoln Electric Company's new modern plant on Euclid Ave., Cleveland, Ohio.

Lincoln Electric to Open Super-Modern Plant

When The Lincoln Electric Company's new plant on Euclid Avenue, Cleveland, Ohio is opened in September, workers, office and factory personnel will all enter a striking brick, glass, and aluminum portal with

unique covered walkway and pass through a door which will deliver them to their work stations. As they go through the doors they will be greeted by a motto on the facing wall, "The Actual is Limited. The Possible is Immense." The motto is appropriate since this super-modern plant represents what these workers have accomplished through cooperative effort inspired by Lincoln's incentive system.

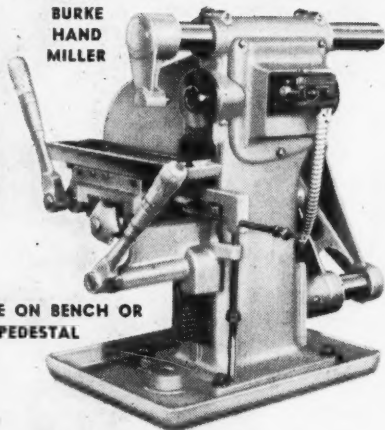
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Send for circular describing various models of power and hand feed millers and attachments.

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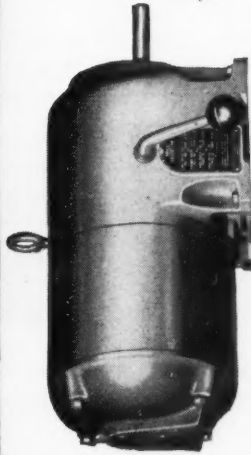
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BURKE
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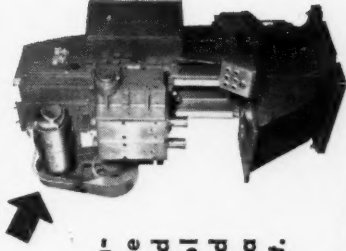


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LIMA maintains a national Sales Engineering staff to assist you in solving your selective-speed drive problems. Let LIMA recommend the drives you need.



Lima Gearshift Drives are making increased profits for the users of the Moline No. 113FB Hydraulic Rail Feed Machine, built by the Moline Tool Company, Moline, Illinois, and powered by a 7½ HP, Type R4 Lima Gearshift Drive as standard equipment.

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(Top Row) Robert J. Fibikar, Gisholt Machine Co.; Adolph J. Tansky, Wright Aeronautical Corp.; Rudolph Perusse, Pratt & Whitney Aircraft; Robert E. Zell, Wyman Gordon Co.; Bill Johnson, Gisholt Machine Co.; Werner I. Senger, Gisholt Machine Co.; Frank Timm, Gisholt Machine Co. (Bottom Row) Arthur E. Pashley, A. V. Roe Canada Ltd.; William Ehringer, Harnischfeger Corp.; Paul Guimond, Boston Navy Yard; Michael Yurescko, Frankford Arsenal; Gaylord Cordrey, General Electric Co.; James G. Brady, Pratt & Whitney Aircraft; Lawrence Horton, Jr., Middletown Air Base.

Gisholt Balancing School Graduates

The accompanying illustration shows the June 29 graduates of the Gisholt Balancing School held at Madison, Wisconsin. These men have completed the required three weeks of instruction and practical work for the Type "U" Course. Classes are being held regu-

larly each month for a new group. First available openings are September 10 and November 5 for the two-week Type "S" Course and October 15 and December 3 for the three-week Type "U" Course. Complete information regarding these courses can be obtained by writing direct to the Gisholt Machine Co., Madison 10, Wisconsin.

MILWAUKEE

DIE FILERS PROFILE GRINDERS

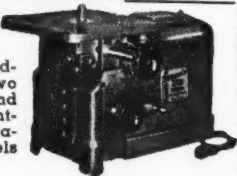
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Model 247B-314 Dial Indicator Gage for checking wall thickness and outside diameter of beer bottles.



Continuous Measuring Gage checks thickness of hard board sheets . . . automatically marks defective areas.



Federal Dimensional Air Gage (range .001" magnification 2500 to 1) used in combination with Dial Indicator.

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If you think of us solely as the makers of world-famous Federal Dial Indicators, here are a few points to remember.

DO YOU KNOW that for over twenty years Federal has been making complete gages for controlling dimensions? We make mechanical gages, stock gages, special gages, air gages, electronic gages, electrical gages, automatic gages, sorting gages, portable gages, big gages, little gages.

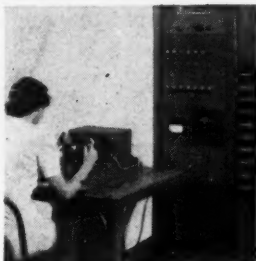
DO YOU KNOW we have over 20,000 gage designs in our engineering files *right now*? Here's one of the greatest storehouses of practical gaging information to be found anywhere.

DO YOU KNOW there's undoubtedly a design in our files that's *right* for your job, requiring the barest minimum of adaptation or special design work? Think of the saving this means to you in time, expense, and experimentation.

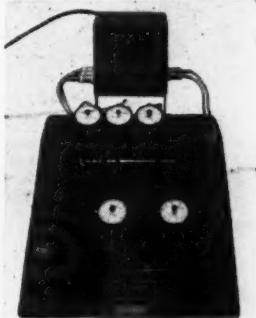
DO YOU KNOW Federal gages work fast, read easily, and reduce operator fatigue because they're backed by experience? For example, the efficient gage we made yesterday for a manufacturer of automotive equipment helps us design and build an efficient gage for *you* tomorrow — whether you manufacture refrigerators or radios, razor blades, or rivets.

DO YOU KNOW our nationwide gage engineering staff is another big reason why so many leading industries come to Federal for Dimensional Gages? They know they can depend on Federal for service, parts, and know-how . . . for on-the-job assistance . . . for help whenever help is needed.

When you have a dimensional control problem, put it up to Federal. For our recommendations, send blueprints indicating dimensions to be checked. No obligation. Also ask for Catalog 61. FEDERAL PRODUCTS CORPORATION, 1148 Eddy Street, Providence 1, Rhode Island.



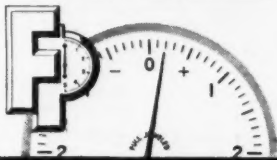
Electronic Gage automatically sorts mica sheets into correct thickness categories.



Electricator Gage for high-speed inspection of many dimensions simultaneously.

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New plant of Miller Motor Co., Melrose Park, Illinois

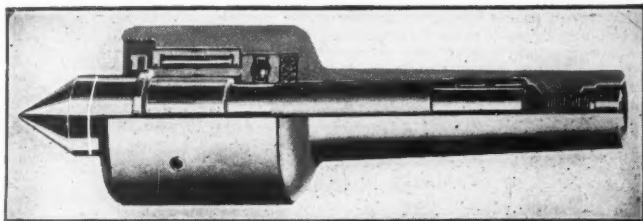
New Cylinder Plant for Miller Motor

To meet the greatly increased demand for its products, the Miller Motor Company, Chicago, manufacturer of air and hydraulic cylinders, has constructed a modern new plant comprising an area of approximately 50,000 square feet at Melrose Park, Illinois, a suburb within the Chicago metropolitan

area. The new plant represents the very latest in modern plant design and layout and is equipped with the latest machines and production facilities.

Two unusual features of the plant's interior are the use of "color dynamics" and the complete intervisibility between all departments of office and factory, glass partitions being used throughout to divide the various de-

TOPS for High Speed Turning



Increase production of high speed turning operations with MOTOR TOOL LIVE CENTERS (Ball and Roller Bearing). The only center with the RED BAND OVERLOAD INDICATOR, which prevents overloading of thrust bearings.

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DETROIT DIE SET ★

partments. The new plant has its own car parking lot and, in general, its location permits convenient access by automobile, bus, truck, or taxi to main rail and air terminals.

First Machine Tool for Manufacture of Self-Reinforced Aircraft Skins Completed

A new defense weapon—believed to be the world's first machine tool for

the manufacture of self-reinforced aircraft "skins"—has been completed by the Giddings & Lewis Machine Tool Co., Fond du Lac, Wis. Aimed at better adapting aircraft to the demands of near-sonic speeds, the revolutionary, three-dimension milling machine will be used by the Lockheed Aircraft Corporation in the manufacture of F-94 jet fighters. Details of the complex new tool were designed by the Giddings & Lewis Company in collaboration with engineers of the General Electric Company and Lockheed in accordance with basic specifications laid down by the aircraft corporation.

The novel machine will mill integral-rib skin panels from solid or rough-forged aluminum alloy plate. This manufacture of airplane surfaces and their stiffening elements as a unit will permit use of the thinner wings and sharper fuselages required for high-speed jet flying. The machine utilizes General Electric motors and control throughout. Operating in three dimensions with two feed motions, it is designed to work in a feed range from three-fourths of an inch to 150 inches a minute with infinite intermediate speeds. A G-E two-dimension electronic tracer control is used to guide the longitudinal and lateral cutting motions simultaneously. The skin mill

HARDENED and GROUND HSS BLANKS
Any decimal diameter to 1/2" — in any length.
Mirror finish surface to gage tolerance. Many uses — punches, gages, measuring wires, special tools, etc. Quick delivery.
Write for price list D-2
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THE *NEW* BUCKEYE Series "A" AIR TOOLS

274 models...single direction and reversible

79% of parts completely interchangeable

Fully adjustable speed control

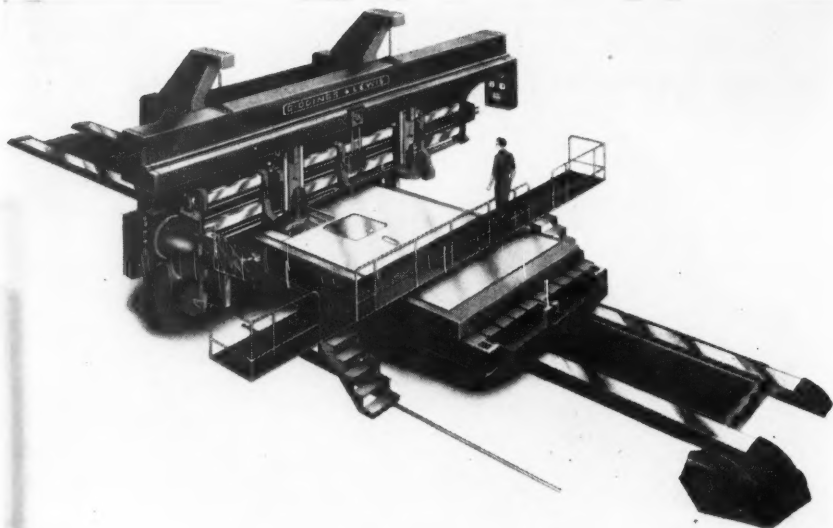
More power developed per c.f.m.

TYPES	CAPACITIES
Drills	to 1/4"
Screwdrivers	to #10 screws
Nutrunners	to 1/4"
Grinders	to 1 1/2" wheel
Shears	to 18 ga.

Buckeye Tools
CORPORATION

DIVISION 17 • DAYTON 1, OHIO for Industry
IN CANADA: Joy Manufacturing Co. (Canada) Ltd., Galt, Ontario

Portable Air
and Electric tools



This giant new machine tool, completed by the Giddings & Lewis Machine Tool Company of Fond du Lac, Wisconsin, is believed to be the first made for the manufacture of integrally-stiffened aircraft "skins." Utilizing General Electric motors and controls throughout, the revolutionary device will be employed by Lockheed Aircraft Corporation in the manufacture of F-94 jet fighters.

also incorporates a vertical rise-and-fall cutting action to control the variations in web thickness. Each of the three milling heads, two of which can be used simultaneously, employs an Onsrud Machine Works water-cooled unit powered by 100 h.p. G-E induction motor parts.

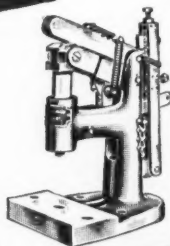
The massive machine (18 feet high

x 30 feet wide x 80 feet long and weighing 200 tons) utilizes 12 drive motors totaling approximately 350 h.p., exclusive of 18 motors and generators delivering the power supply. A 20 h.p. motor is used to drive the table, with its 100-ton load capacity, and smaller motors move the cutting heads on their guide rails.

HIGH-SPEED

COLD RIVETERS

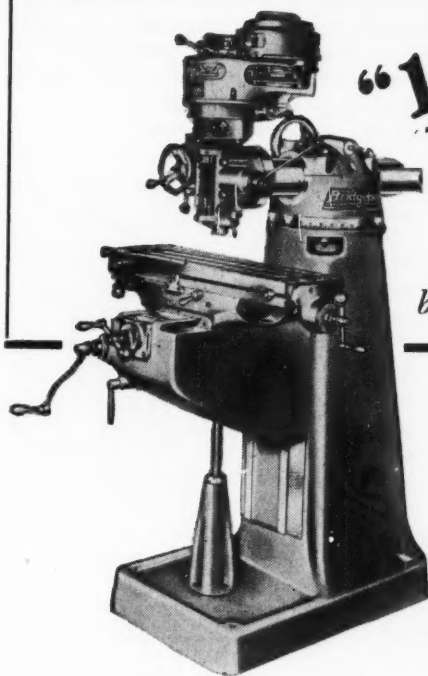
Thousands of happy users started with us by submitting sample assemblies of their riveting work. Without charge we studied their particular problem, and returned the assembly properly riveted with complete analysis, recommendations and quotations. • It's a FREE service, that may save you time, materials and spoilage—and speedup production. Why not write us?



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Is YOUR problem DIFFERENT? We have met and solved thousands of such problems—from cameras and meters to toys and electrical items. • Anything for staking or riveting fixed or movable joints—anything in eyeletting, grommeting, burring, pointing with platinum, tungsten, silver—whatever your problem, we can help you. No obligation. Write us.

HIGH SPEED Hammer Co., Inc.
307 Norton St.
Rochester 21, N. Y.



"13,739"!!

... the Serial Number
of the next

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... a 12-year record of Achievement

More than 13,000 Bridgeport Turret Milling Machines have gone into tool rooms and on production lines in the past 12 years.

This remarkable acceptance of "Bridgeport" versatility, convenience, speed and accuracy may, for all we know, be a sales record for a machine of a given size and type. In any event, it is an indication that "Bridgeports" provide a class of service which is almost universally demanded in metal working shops.

The new 1 HP head now available for Bridgeport Turret Milling Machines and a wide range of modern attachments are concrete evidence of how Bridgeport has extended the capacity and utility of these machines to keep abreast of today's needs.

It will be to your advantage to ask for further details.

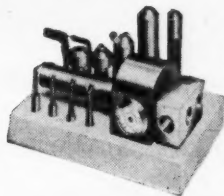
RIGHT ANGLE ATTACHMENTS



(Left) Heavy Duty attachment (made in two sizes) applicable to Master as well as 1 H.P. Bridgeport heads.

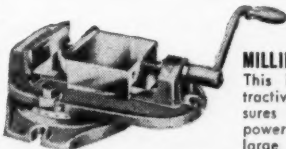


(Right) Light Duty type for milling and drilling narrow, deep molds and cavities.



NO. 2 BORING HEAD

With this attachment, holes up to 6" diameter can be bored. It is applicable to the Bridgeport 1 H.P. Milling, Drilling and Boring Attachment.



MILLING MACHINE VISE

This improved vise, attractively streamlined, assures greater gripping power provided by a large diameter screw. A coolant trough adds to its utility. Made in two sizes: 5" x 3 1/2" and 6" x 5" jaw openings.

***Bridgeport* MACHINES, INC.**

Bridgeport, Connecticut

Manufacturers of High Speed Milling Attachments and Turret Milling Machines

Contest Judges Present Carlton President with List of Winners

The grand prize in the Carlton Column Clamp Name Contest was split by R. L. Kessler, assistant master mechanic, employed in one of Indiana's major industries, and M. G. Gross, subforeman, Norfolk & Western Railway, Roanoke, Va. In the opinion of the judges, Mr. Kessler's "RIGIDLOK" had a slight edge over Mr. Gross' "RIGID LOCK," but directed that both contestants share in the top cash award of \$500.

Entries in the Carlton Contest were judged at the Carlton plant Friday, April 20, by Wendell E. Whipp, chairman of the board of Monarch Machine Tool Co.; Charles W. Simpson, executive vice president of The National Acme Co.; and Burnham Finney, editor-in-chief of American Machinist.

The contest, sponsored by Frank Moran, Carlton vice president and

sales manager, was held for the purpose of obtaining a suitable name for a new column clamping device now being built on Carlton radial drills. Several hundred entries were received from contestants all over the United States. Qualified entries were also received from France and Austria.

The Carlton distributor salesmen serving the two grand prize winners have been awarded a cash bonus of \$50 each, according to Carlton officials. They are: Carl Rayber, State Machinery Co., Indianapolis, and "Pat" Moore, The Henry Walke Co., Norfolk.

In addition to the grand prize winners, the judges also selected 12 top honorable mention award winners who will receive Parker '51 pen and pencil sets. More than a hundred additional honorable mention awards have been distributed by Carlton to other contestants whose entries were considered to be worthy of recognition.

Dependable MEASURING & CHECKING EQUIPMENT

and Now

Cadmium Plated

Non-rusting — good looking

READY TO DELIVER



STRAIGHT and OFFSET TYPE



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In 15 sizes, ranging from 3 x 4 x 12 and up.



UNIVERSAL ANGLES
In 10 sizes, ranging from 4 x 3 1/4 x 5 and up.



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In 19 sizes, ranging from 4 x 9 x 5 and up.



SURFACE PLATES
Over 50 sizes, ranging from 7 x 7 1/2 to 96 x 192.

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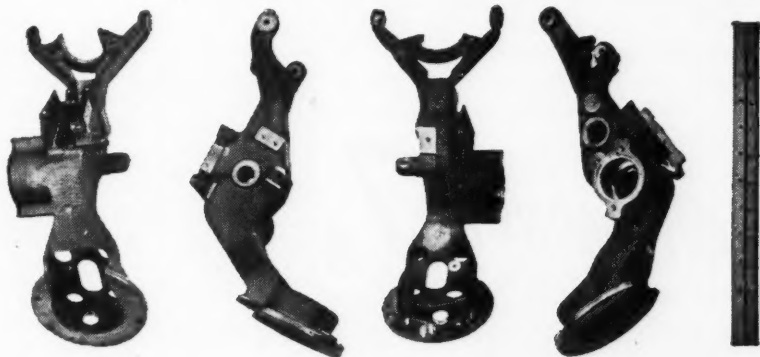
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6771 E. McNichols Road • DETROIT 12, MICHIGAN



Hole Location Practices

Published in the interests of greater accuracy and quality in the toolroom and on the production line by the Moore Special Tool Company, Inc. 730 Union Avenue, Bridgeport 7, Conn., builders of Jig Borers, Jig Grinders, Panto-Crush Wheel Dressers, Die Flippers, Motorized Centers and a complete line of Hole Location Accessories.



Take a good look at this precision part. It's magnesium, and has a total of 31 holes—some bored, some tapped, and 2 large ones recessed. There are 20 separate milling cuts. In addition, the base and the bevel on base are turned. All these faces and holes are held to 0.0005". Imagine how many operations it would take, the number of different machines needed, and the time expended in producing 100 of these parts.

THE COMPLETE JOB WAS DONE ON THE MOORE JIG BORER in a fraction of the time required by other means. One simple block fixture was used to hold the part around the base for all operations. Using the Moore micro-sine table and parallel set-up blocks, only 11 set-ups were necessary.

The speed, accuracy and simplicity of operation of the Moore Jig Borer are the results of a combination of time-proven features, including hardened, ground and lapped lead screws for precise, rapid table settings within 0.00015"

by coordinate location; infinitely variable spindle speeds—push-button controlled—from 75 to 2400 RPM; three power-feed ratios—0.0015", 0.003" and 0.006"—per revolution of spindle in either direction; centralized control panel; disconnect clutch for easy indicating and totally enclosed drive mechanism.

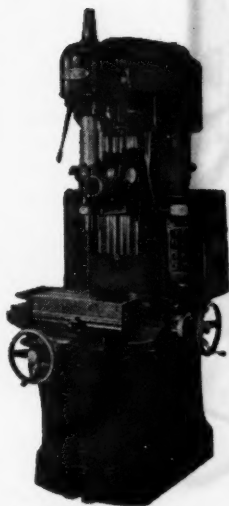
● Write for the new 24-page No. 2 Jig Borer catalog, which contains complete design specifications, describes Jig Borer accessories and gives further examples of Jig Borer jobs—in the toolroom and on the production line.

Valuable Book for Defense Plant Training



Many examples of jig-boring and jig-grinding practices. 448 pages, 400 illustrations. 184 pages of Woodworth Coordinate Location Tables from 3 to 100 holes. Available at special price of \$3 in U.S.A.

\$3.50 elsewhere. Send check or money order to Moore Special Tool Co., Inc., Bridgeport, Conn.



No. 2 MOORE JIG BORER Table Working Surface of 10" x 19"; accurate lead screws; infinitely variable spindle speeds, 75 to 2400 RPM; 3 power feed ratios.

Did You Know That ---

The Billings & Spencer Co., Hartford, Conn., manufacturer of wrenches and shop tools, has announced the appointment of **Paul E. Rosenbaum** as direct representative for Missouri, Nebraska, Kansas, and portions of Iowa and Illinois. Mr. Rosenbaum will make his headquarters at 6816 Natural Bridge, St. Louis.

Frank L. Munsey, factory manager, has been appointed assistant plant manager of the Sandusky, Ohio plant of the New Departure Division, General Motors Corp., Bristol, Conn. **Raoul L. Larue** succeeds Mr. Munsey as factory manager of the plant.

— o —

Air Reduction Sales Co., Division of Air Reduction Co., Inc., New York 17, N. Y., has announced the appointment

of **Edward H. Roper** as manager of the General Technical Sales Department. Mr. Roper was previously assistant manager of this department, whose function it is to assist nationwide users of Airco products and processes in their proper applications.

— o —

According to an announcement made by **Elmer F. Twyman**, vice president in charge of the Philadelphia Division, Yale & Towne Mfg. Co., Philadelphia, Pa., **Norman R. Amberg** has been appointed assistant works manager and **Harvey W. Wesenberg** supervisor of materials handling of the division.

SAVE MONEY 7 WAYS..



*PATENTED

For information and prices write for Meyco Bushing Catalog No. 16



W. F. MEYERS CO., INC., BEDFORD, INDIANA

ON PRODUCTION DRILLING!

MEYCO

**Carbide Inserted Bushings
Are Doing It Daily!**

HOW? Like this: (1) Last longer... with a life—in most cases—as long as solid carbide bushings at prices that come close to the prices of ordinary steel bushings; (2) Increased life for your drill jigs and fixtures; (3) Increased life for your drills and reamers; (4) Accuracy maintained for a LONG PERIOD of time; (5) Less non-productive machine time, less lost man hours, because bushings need not be changed as often; (6) Inspection time saved, because of greater accuracy for a longer time; and (7) Less waste due to spoilage, for the same reason. Don't pass up a good bet! Get the dope on MEYCO Carbide Inserted Drill Jig Bushings today!



10" or 14"
TWIN WHEEL
 WET OR DRY
TOOL GRINDER

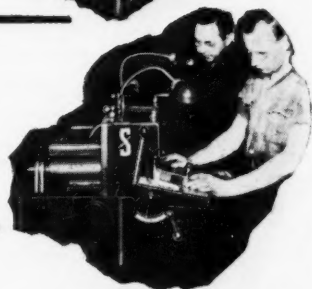
FOR CARBIDE, STELLITE OR
 HIGH SPEED STEEL TOOLS

*one step
 from rough
 to finish grind*



(Right) Mounting a new wheel in 5 minutes!

(Right) Operating view of 10 TD shows ample room to comfortably serve two operators. (Twin lights are optional.) Complete operator comfort when grinding wet. Absolutely no spray or splash.



UNIVERSAL PRECISION
 PROTRACTOR—TOOL
 GUIDE with DRESSER
 grind any size tool
 for any desired angle.

**THE STANDARD
 ELECTRICAL TOOL CO.**

2487 RIVER ROAD
 CINCINNATI 4, OHIO

WRITE FOR BULLETIN TW

ALSO:
 GRINDERS—ALL KINDS! UP TO 100 H.P. • BUFFERS—POLISHERS UP TO 60 H.P.
 ABRASIVE BELT MACHINERY • SPECIAL MACHINERY • TWIN WHEEL TOOL GRINDERS

Did You Know That ---

Gerard Freeman, executive vice president of Supreme Products, Inc., Chicago, Ill., has announced the appointment of **Michael Egan** as sales manager of the Chuck Division. Mr. Egan previously spent nine years in Chicago, Florida, and Boston for Skill-saw, Incorporated, and the last three years as assistant sales manager of Cummins Portable Tool Company.

J. Y. Scott, president, and the board of directors of the Morse Twist Drill & Machine Co., New Bedford, Mass., have announced the election of **C. F. Myers**, former sales manager, to vice president and sales manager. **A. L. Carr** continues as vice president and director of sales.

— 0 —

W. H. SaLee has been elected vice president of the Janette Mfg. Co., Chicago, Ill., manufacturer of gear-mo-

tors, motorless speed reducers, rotary converters, generators, and motor generators. Mr. SaLee, general manager for the past 1½ years, has been with Janette in various capacities for 26 years.

— 0 —

M. D. Fuller, Boice-Crane factory representative in the Middle South since 1933, retired recently and has been succeeded by **Allen Cook**, 802 Holcombe Ave., Mobile, Ala., who will travel the same Middle South territory relinquished by Mr. Fuller, representing the Boice-Crane line of woodworking machines.

BETTER LIGHT for Machine Tools, Assembly and Inspection Benches

LOCALITES

The Finest of All
Localized Lighting Units



MODEL 099-PX-412

Overall length 35½". Three instantly adjustable joints. Reflector accommodates 100 watt A-21 medium screw base lamp.

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EACH in pkg. of 4
Single Units \$16.60 ea.

- **All Wiring Fully Enclosed** — completely protected from wear or insulation damage from oils and fumes
- **Adjusta-tension Joints** — tension easily adjusted for freedom of arm movement to suit worker and job
- **Universal Base** — mounts on outlet box or directly on machine or bench
- **Baked Enamel Finish** — exterior, Vista Green — Reflector interior, high temperature White

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calized models with
various type reflectors,
arms and bases for every
industrial use.

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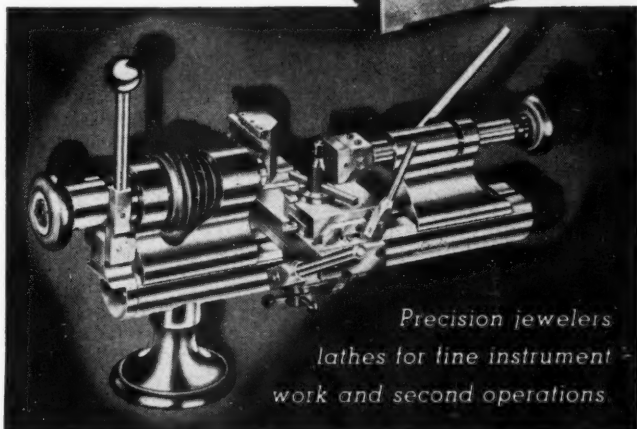
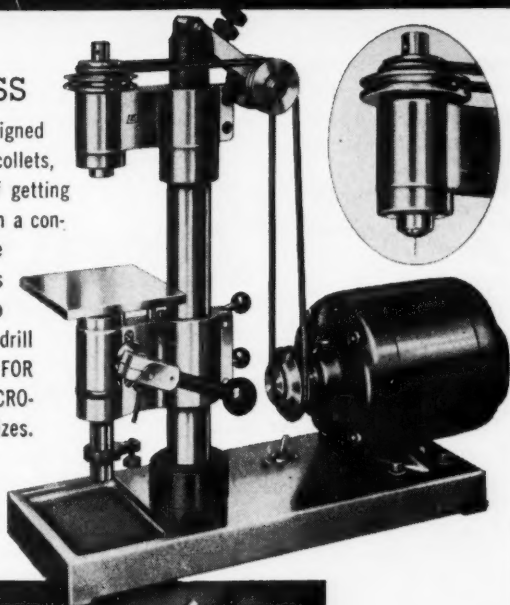
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LEVIN[®] TOOLS ARE DESIGNED TO MAKE DELICATE PRECISION EASIER

MICRO-DRILL PRESS

The Levin Micro-Drill Press is designed to hold small drills in precision collets, thus overcoming the difficulty of getting a drill to run true as when held in a conventional drill chuck. The absence of a sliding quill guarantees maximum sensitivity with fingertip control. A mounted $\frac{1}{8}$ " capacity drill chuck can also be used. WRITE FOR BULLETIN H DESCRIBING THE MICRO-DRILL PRESS and listing collet sizes.

*for drilling holes
as small as .002"*



*Precision jewelers
lathes for line instrument
work and second operations.*

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CATALOG E
DESCRIBING
LATHES AND
ACCESSORIES**

COMPLETE CATALOG illustrates and describes full line of accessories . . . compound slide rests, grinding, milling and screw cutting attachments, cross slide, collet closer and other useful items

LOUIS LEVIN & SON INC., 782 E. PICO BLVD., LOS ANGELES

Did You Know That ---

George C. Rodgers and **Irving W. Clark** have been named managers of the respective Military Sales Departments of American Air Filter Company operations in Moline, Illinois, and Louisville, Kentucky. Mr. Rodgers was recently connected with Berry Motors, Inc., Corinth, Miss., in a consulting capacity and previous to that was with

the Curtiss-Wright Corporation for 14 years in various executive and administrative capacities. Previous to joining American Air Filter Company, Mr. Clark was executive vice president for the General Plywood Corporation of Louisville.

— o —

Charles A. Bonn has been appointed abrasive grain engineer for Norton Co., Worcester, Mass., and will cover principally Ohio and Michigan, with headquarters in the company's Cleveland district office. In the traffic department of Norton, **Charles H. Mercier** has been named supervisor of foreign traffic, Abrasive Division, and **Frederick D. Wilson** supervisor of domestic traffic, Abrasive Division.

— o —

The Hilliard Corp., Elmira, N. Y., has announced the appointment of **Guy T. Martin & Co., 642 E. Olive St., Gardena, Calif.**, as its representative in this state to distribute the entire line of Hilco lubricating, fuel and industrial oil purification equipment.

QUALITY + SERVICE

2 GOOD REASONS TO
STANDARDIZE ON

MAUREY FHP V-DRIVES

Maurey V-Drive quality means lasting, low cost, trouble-free performance plus prompt delivery from complete stocks. Maurey Hi-Q single and two-groove and variable pitch V-Pulleys of Pressed Steel and Cast Iron come in 1736 different sizes for any FHP speed ratio or standard shaft. Maurey MOR-GRIP long-life V-Belts meet all FHP drive needs. In addition, Maurey builds special V-Drives to meet special requirements. Investigate the Maurey combination of Quality, Service and Low Cost, and see why leading manufacturers have standardized on Maurey V-Drives.



Immediate Delivery
from complete stock at
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Write today for Bulletins describing

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MAUREY MANUFACTURING CORP.

World's largest manufacturer of pressed steel and cast iron
FHP V-Pulleys... serving industry since 1917

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Backstand Method Saves Time!

Milwaukee Electric Tool Corp.
eliminates a complete operation
... increases production 40%

Problem: The Milwaukee Electric Tool Corp. had a time-consuming method for sanding cast aluminum motor housings for portable electric tools. After polishing with a hard wheel, they sanded with a #46 set-up wheel, and finished with a grit #100 set-up wheel. This was too long and too costly an operation.

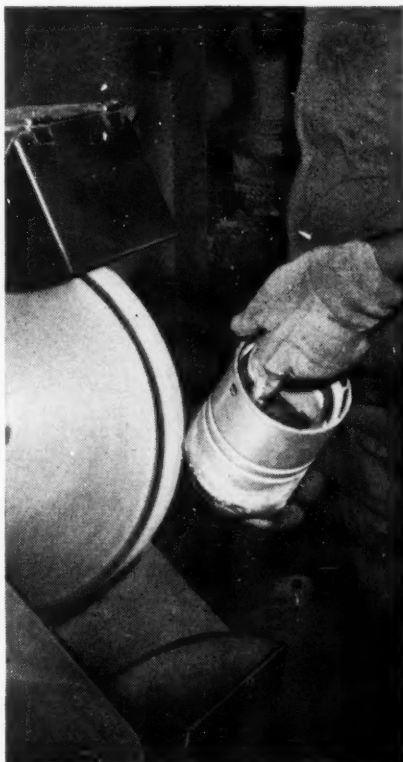
Solution: The Milwaukee Electric Tool Corp. switched from the hard wheel and set-up wheels to the backstand belt for this polishing job.

Result: Now one Armour Backstand Belt does the work of the hard wheel and the #46 set-up wheel. A better finish is obtained and production is up 40%!

Manufacturers of hundreds of different industrial and consumer items have proved the backstand belt method is more efficient and economical than the set-up wheel.

If you are grinding, polishing or finishing flat or contoured surfaces, cast, stamped or forged pieces, the backstand method can help solve your production problems.

Learn more about the backstand belt method. Send now for our free booklet.



Mail this coupon today!

Please send me the booklet "Facts About Backstand Belt Grinding and Polishing."

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Did You Know That ---

Platen Products Co., 111 E. Ten Mile Rd., Box T, Hazel Park, Mich., has announced the change of the company name to **Periflex Inc.** to correspond to the "Periflex" trade name of its line of precision molded hydraulic and pneumatic packings. This change in no way reflects any change in ownership, organization, and personnel of the company.

The Annual Meeting of the **Metal Treating Institute**, 271 North Ave., New Rochelle, N. Y., has been set for October 12, 13, and 14 in Detroit, Michigan, according to information released by C. E. Herington, executive secretary of the Institute.

— o —

John C. Cotner, president of The Hydraulic Press Mfg. Co., Mount Gilead, Ohio, has announced the appointment of **William S. Renier** as director

of engineering. Mr. Renier's position as director of engineering will embrace all phases of engineering research and development of the company's products in the field of hydraulics and hydraulic equipment.

— o —

The **Heli-Coil Corp.**, Long Island City, N. Y., manufacturer of helical - wire thread inserts, has announced the election of **Eugene M. Lang** to the position of vice president in charge of manufacturing. Mr. Lang, former works manager at the Heli-Coil plant, has served the firm in various executive and production capacities.



STOP making your own punches
WE'LL MAKE ANY PUNCH AT A
PRICE BELOW YOUR OWN COST!

pivot punch

precision punches for EVERY purpose from ONE dependable source

- The only one stop Punch Source.
- More than a Punch. It's a Punch Service!
- No Need to Stop to Standardize. 276,000,000 sizes and styles at standard catalog prices. No hidden prices for "in-Between" Sizes.
- Any Type of Punch in a Choice of Four Qualities. A punch for every purpose — a punch for every cost at prices below your own cost to manufacture.

SEND FOR NEW FREE CATALOG. WRITE DEPT. 3.

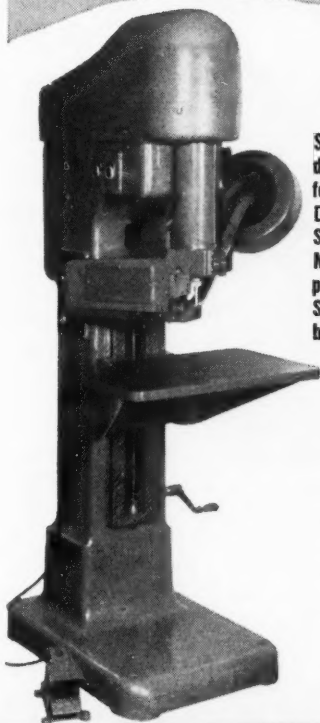
ONE SOURCE FOR ALL OF YOUR PUNCHES

pivot punch
DIVISION OF PIVOT PUNCH AND DIE CORPORATION
NORTH TAVENHURST, N. Y.

Again

D.P.S. **Comes Through**

**WITH A SOLUTION TO ANOTHER PRESENT-DAY
PRODUCTION PROBLEM—NUT DRIVING**



Send for further details, also information about D. P. S. Power Screwdrivers, Motorized Hopper Units and Special Assembling Machines.

**No Need to Limp
Along With Slow Hand-
Operated Tools—**

**USE THIS
REMARKABLE NEW
NUT
DRIVER**

Backed by a quarter century's experience in meeting production assembly problems, the Detroit Power Screwdriver Company replaces another outmoded method in bringing out this outstanding hopper-fed nut-driving machine . . . Amazing speed is attained, either automatically or semi-automatically, in driving nuts from $\frac{3}{16}$ " minimum to $\frac{11}{16}$ " maximum across flats . . . The manual handling of nuts is entirely eliminated except to load the hopper which feeds the nuts to the driving spindle. The machine is equally efficient for special nuts such as Jam, Castellated, Lock, etc.

DETROIT POWER SCREWDRIVER CO.

2807 W. FORT ST.

DETROIT 16, MICH.

Did You Know That ---

The appointment of **S. D. Flinn** as comptroller of the United States Steel Supply Company of Chicago has been announced by Leslie B. Worthington, president of this subsidiary of United States Steel Corporation. He succeeds **F. L. Warnke** who has joined the United States Steel Company in Pittsburgh.

West Point Manufacturing Company, manufacturer of fixture clamps and fixture fittings, has moved from its former location in Farmington, Michigan, to a new and larger plant at 26935 West Seven Mile Road, Detroit 19, Michigan.

— o —

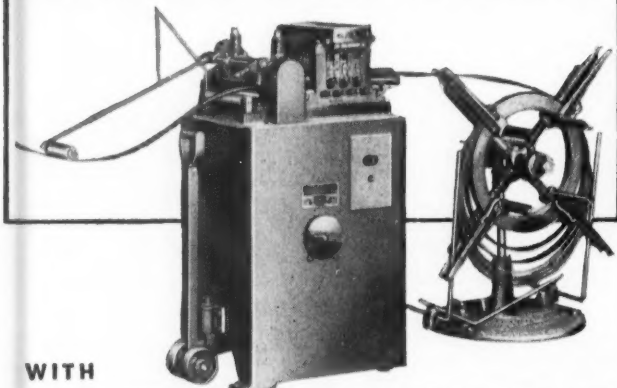
Russell E. Starbard has been appointed a buyer in Norton Company's Purchasing Department, replacing

Robert F. Kirkpatrick who has been called into service in the Army Air Force. Mr. Starbard came to the Purchasing Department from the company's Grinding Machine Division where for ten years he was engaged in methods, sub-contracting, jobbing, and industrial engineering work.

— o —

John C. Cotner, president of The Hydraulic Press Mfg. Co., Mount Gilead, Ohio, was elected director of the Machinery Division of the Society of the Plastics Industries, Inc., at the annual conference held recently at White Sulphur Springs, Virginia.

STRAIGHTEN COIL STOCK FOR PRESSES, SHEARS OR SLITTERS



WITH

LITTELL Variable Speed STRAIGHTENING MACHINES

Output rises, costs drop when coil stock is fed to the press, the shear, or the slitter through a Littell Straightening Machine. Coil stock comes out of a Littell Straightener flat, with curvature removed. Equipped with variable speed transmissions, Littell Straighteners are easily adjusted to meet a wide range of speed requirements. Thirteen medium and heavy duty models straighten coil stock of all standard widths and thickness.



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MACHINES • REELS • AIR BLAST VALVES
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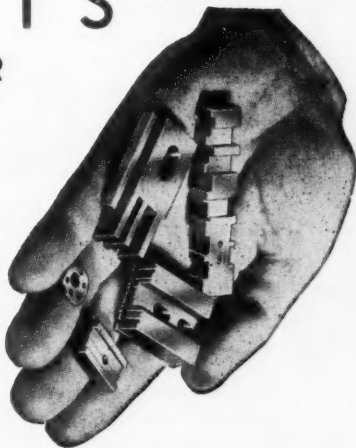
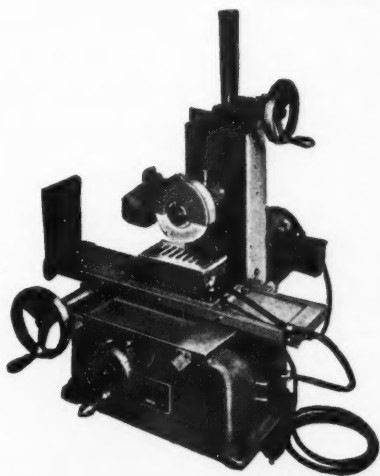
SANFORD

SURFACE GRINDER

IF IT FITS Model SG

**IN THE PALM OF YOUR
HAND**

**GRIND IT ON THE
SANFORD**



The capacity of this sensitive highly accurate, Bench Model is 4" transverse—8" longitudinal—6" vertical under 4" Wheel. Meehanite Castings and a very sturdy construction assure long life, vibrationless operation and finishes to micro-inches.

Write for complete details.

**SANFORD MANUFACTURING COMPANY
TOOL COMPANY
UNION, NEW JERSEY**

Did You Know That ---

The election of **I. Melville Stein** to the newly created post of executive vice president has been announced by the directors of the Leeds & Northrup Company, Philadelphia manufacturer of electrical measuring instruments, automatic controls, and heat-treating furnaces. Mr. Stein has been vice president and is director of research.

George F. Smith, 86, representative of Heller Brothers Co., Newcomers-town, Ohio, for the Southeast and Southwest died recently at his home in Baltimore. Mr. Smith had been associated with the Heller Company for over 40 years.

— o —

The Bridgeport Brass Co., Bridgeport 2, Conn., has announced the appointment of **L. E. Menns** as Pacific

Coast sales manager. Mr. Menns, who has been serving as Los Angeles district manager for Bridgeport, will be in charge of the San Francisco district office and warehouse as well, and will be responsible for the sale of all Bridgeport products on the Pacific Coast.

— o —

Martin J. Holleran has been named assistant manager of tool steel sales by The Carpenter Steel Co., Reading, Pa. Mr. Holleran joined Carpenter in 1946 and served as sales engineer out of the company's New York City mill-branch warehouse until his recent promotion.



**Machine de-burring
with NOBUR
pays BIG production dividends!**

NOBUR Tools turn a slow bench operation into fast and efficient machine work! Remove burrs on multi-walled parts with a smooth, clean cutting action that won't mar highly finished surfaces. Eliminate rejects from slow, costly hand work with files, scrapers and abrasives.

Nobur Tools are used on any lathe, drill press, portable drill or flexible shaft. Operation of the double-edge cutting blade is easy and safe... no skilled help is required, and the spindle never needs to be stopped for either de-burring or chamfering.

Nobur Tools cut freely on either hard or soft metals, are simple in construction and are made in sizes to cover a full range of hole diameters. *NEW "DS" SERIES extends range of NOBUR applications to holes as small as 1/8" diameter. **WRITE FOR FULL DETAILS TODAY!**

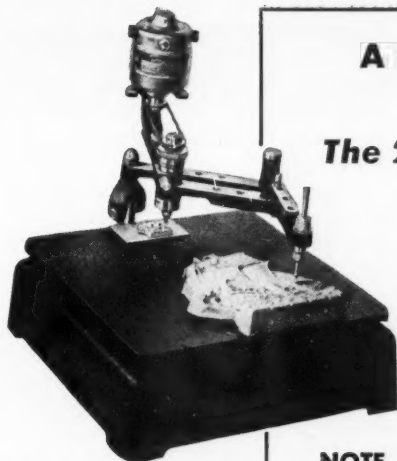
Parts like these quickly de-burred with



NOBUR TOOLS

NOBUR MANUFACTURING COMPANY

717 N. VICTORY BLVD., BURBANK, CALIF.



Send for complete specifications and attractive price list.

**MICO
INSTRUMENT CO.**

73 Trowbridge Street
Cambridge, Mass.

A BETTER ENGRAVER AT LOWER COST The 2 and 3-Dimensional

MICO

Fills the long-felt need for a portable, inexpensive and dependably accurate machine for making small dies, molds, templates, etc. Extremely simple to operate.

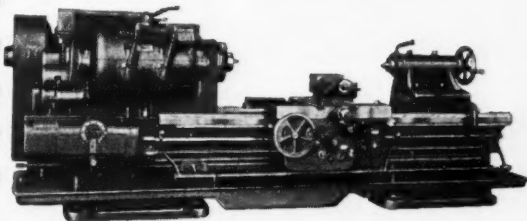
NOTE THESE SUPERIOR FEATURES

- Engraves 2 or 3 dimensions.
- Pantograph permits 4 reduction ratios.
- Micrometric depth control graduated in thousandths of an inch.
- Entire spindle assembly removable to facilitate cutter grinding.
- Rugged cast iron construction with exclusive adjustments for insuring quick, accurate setting.

**FOR 56 YEARS
BUILDERS OF TOP
QUALITY MACHINE
TOOLS**

BOYÉ & EMMES
in Cincinnati
Since 1895

Complete line of Heavy
Duty lathes — sizes 14"
through 32"



Boyé & Emmes are exclusive manufacturers of good, rugged, dependable lathes, which meet the requirements of precision operations throughout industry. Simplicity, ease of operation, power, rigidity, accuracy and long life are incorporated in our modern machine tools.

THE BOYÉ & EMMES MACHINE TOOL CO.

125 CALDWELL DRIVE

CINCINNATI, OHIO

Did You Know That ---

George V. Luerssen, formerly chief metallurgist, has been appointed vice president in charge of metallurgy by the board of directors of The Carpenter Steel Co., Reading, Pa. He succeeds **B. H. DeLong**, who announced his retirement as vice president and technical director after 41 years of continuous service with the company.

Robert T. McMahan, formerly chief engineer, has been appointed plant manager of the Boye & Emmes Tool Co., Cincinnati, Ohio, manufacturer of geared head engine lathes.

— o —

H. H. Whitmore, general manager of the Jones & Lamson Machine Co., Springfield, Vt., has announced the appointment of **Jordon D. Wood** as public relations manager, in which capacity he will be

responsible for the company's advertising and public relations program. **Demond Mello**r will continue in the capacity of advertising manager of the company.

— o —

Operating out of the western sales office at 416 Citizens Bank Building, Pasadena 1, California, **Ralph H. Cockroft**, western sales manager for Flexible Tubing Corp., Guilford, Conn., directs all company sales activities in the 11 far western states: California, Oregon, Washington, Idaho, Montana, Wyoming, Nevada, Arizona, New Mexico, Colorado, and Utah.

TAC does what no other tool can do!

AT LAST! AN OPEN-END RATCHET WRENCH — the world's first true universal wrench. A patented design for connections on tubing, rods, piping, conduit, studs, etc. Sixty-four socket sizes from $\frac{1}{8}$ " to 4". Smallest effective ratcheting arc yet — 5° to 7°. TAC will also do every job any ordinary ratchet wrench will do: one TAC set replaces literally dozens of single-purpose hand tools.

makers of
advanced tools
for industry

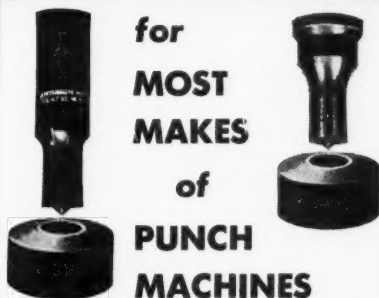


TAC is the registered trademark of

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Punches and Dies



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**MOST
MAKES**
of
**PUNCH
MACHINES**

LARGE RANGE OF ROUND, FLAT, OVAL
AND SQUARE SIZES CARRIED IN STOCK
FOR IMMEDIATE SHIPMENT.

Send for catalog sheets.

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317 EAST 47TH ST. NEW YORK 17, N. Y.

"Get them from Gillen"



TAPER PINS
MACHINE KEYS
SPECIAL MACHINE PARTS
WOODRUFF KEYS
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SAWMASTER HACK SAW



LOW PRICED

PORTABLE
SELF-CONTAINED

READY TO WORK

Angle
Cutting
Vise

STURDY
ECONOMICAL

Write for Bulletin
No. 300

MILLER-KNUTH MFG. CO. OMAHA, NEB.

Did You Know That ---

Wall Colmonoy Corp., Detroit 3, Mich., manufacturer of corrosion, wear, abrasion, and impact resistant alloys, has announced the opening of a new office and warehouse at 5815 Clinton Dr., Houston 1, Tex. **Henry L. Howard**, who for the past six years was on the staff of a large welding distributor in Texas as a sales engineer, has been appointed manager of this branch office.

— o —

The Detroit Broach Co., Detroit 34, Mich., has announced the appointment of **J. E. Polhemus** as representative for southern and eastern Wisconsin. Mr. Polhemus will make his headquarters at 833 E. Kilbourn Ave., Milwaukee 2, Wisconsin.

Arthur J. Williamson has been appointed vice president in charge of manufacturing operations by the Tube Reducing Corp., Wallington, N. J. For 13 years prior to this appointment, he was with the Summerill Tubing Company, for five years as plant manager at Carnegie, Pennsylvania, and as chief metallurgist at the Bridgeport, Pennsylvania plant.

— o —

Air Reduction Co., Inc., New York 17, N. Y., has announced the appointment of **S. D. Baumer** as vice president of the Airco Equipment Manufacturing Division. Joining the Airco General Technical Sales Department in 1941 as steel mill specialist, Mr. Baumer was appointed assistant manager of that department in 1944 and manager in 1948.



GOES A LONG WAY

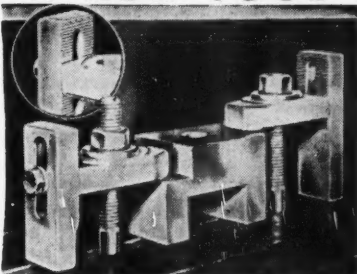
to eliminate weld spatter cleanup

Unightly costly weld spatter simply wipes off, in a matter of seconds, when you brush or spray Protect-O-Metal No. 2 in the weld seam and on adjacent surfaces before welding. And you save up to 85% of weld cleaning labor, conserve man-hours for productive work. Weldors like Protect-O-Metal because it contains no organic materials, cannot cause smoke, fumes, or odors. *A little goes a long way*—costs 1/10¢ per foot of weld—saves up to three times its cost in time savings alone. Order a trial gallon (\$3.25) on a no risk basis. If you're not completely satisfied we will cancel the invoice.

PROTECT-O-METAL
POM
GWSMITH

G. W. SMITH & SONS, INC., 5407 Kemp Road, Dayton, O.

A NEW TOOL



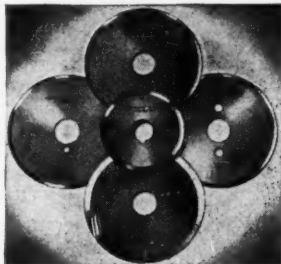
- Quickly switch from large to small workpieces without time wasting, tedious hunting of scrap shims. How? Easy with these drop forged, serrated clamps. Holds work up to 6" high.
- Set contains crosspieces (2 plain, 2 goosenecks) and uprights (2 each of 2", 3", 4" and 6"). Crosspiece take up to 3/8" T Bolts. **\$19.50.**
- FOR 10 DAY FREE TRIAL MAIL AD TO:

MONTGOMERY & CO., Inc.

Since 1874

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PIPE and TUBE CUTTING

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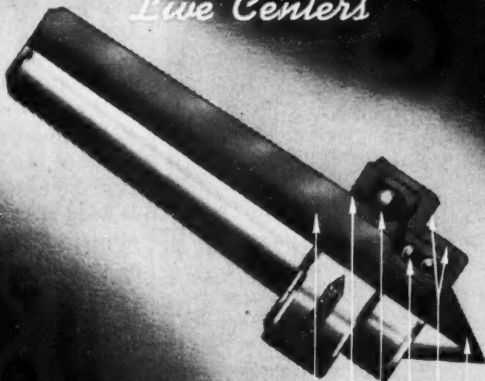
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Book Reviews

Analysis of the Four Bar Linkage.

By John A. Hrones and George L. Nelson. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 730 pages. Illustrated. Cloth binding, board covers. Price, \$15.00.

A new approach to the problems of the synthesis of mechanisms to produce desired motions is presented in this volume. The authors provide an

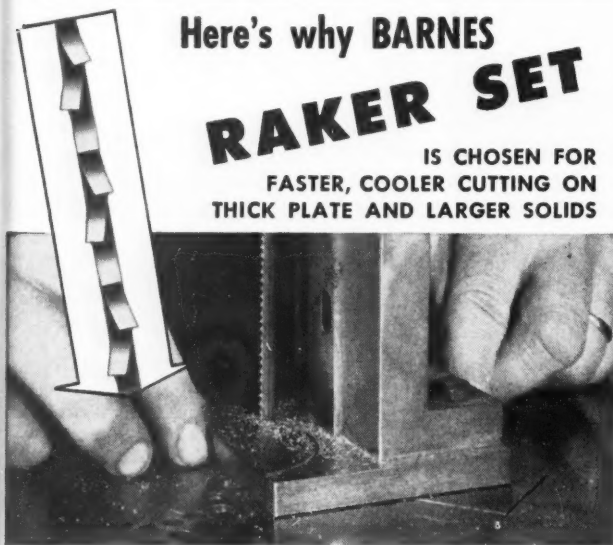
exhaustive survey of the displacement and velocity characteristics of a four-bar linkage in the range of operation where the driving crank makes a complete revolution while the follower crank oscillates. Using extra large size diagrams (11 x 17 inches) in their book, the authors include over 7,000 displacement paths representing about 500,000 solutions. Some text material analyzes the application of the diagrams to specific design problems.

With this volume, the designer of machine tools, vending machinery, mechanical toys, conveying equipment, computing machinery, and other equipment can quickly locate the basic dimensions of the linkage he requires, in many cases avoiding mathematical computations or the use of cams. Regarding the authors of the book, Professor Hrones is head of the machine design division and director of the dynamic analysis and control laboratory at the Massachusetts Institute of Technology, while George L. Nelson is assistant professor of mechanical engineering at the Institute.

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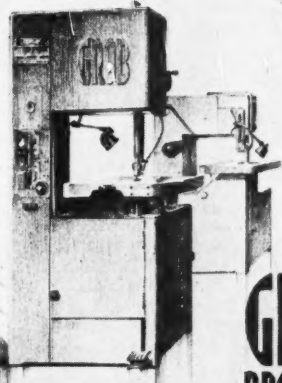


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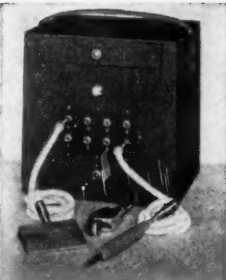
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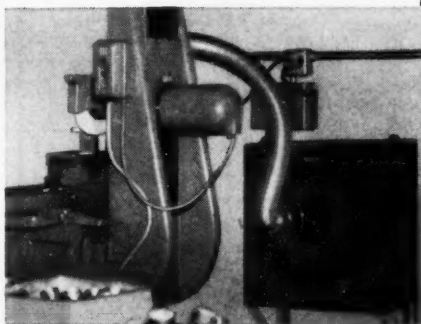
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American Standard Tolerances for Ball and Roller Bearings, B3.5-1951. Published by American Standards Association, 70 E. 45th St., New York 17, N. Y. 20 pages. Paper covers. Price, 75 cents.

The second of a series of anti-friction bearing standards under development by a committee representing 14 trade associations, technical societies, and the U. S. Army and Navy, this

standard establishes tolerances and limits of size governing dimensional interchangeability of various types of bearings. The standard contains 15 tables specifying tolerances on the bore, outside diameter, width, and other characteristics of a bearing in different grades of accuracy required for various bearing applications. Types of bearings covered include annular ball; cylindrical roller (including journal); magneto; thrust ball; industrial and airframe needle; and tapered roller bearings.

Specifications are also given for the maximum permissible variation in diameter between the largest and smallest ball or roller in any assembled bearing; for the hardness of balls, rings, and rollers; and for snap ring and groove dimensions. The tolerance classes ABEC-1, ABEC-3, ABEC-5, ABEC-7, RBEC-3, and RBEC-5, adopted by the Anti-Friction Bearing Manufacturers Association have been used in this new standard.

Additional information can be obtained by writing directly to American Standards Association.



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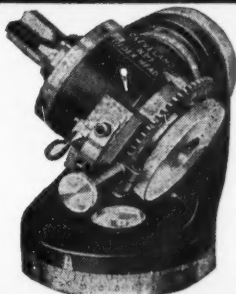
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Stock Removal — Stem	.004" - .006" in TWO passes	.004" - .006" in ONE pass
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Timestudy Fundamentals for Foremen. Second Edition. By Phil Carroll. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y. 208 pages. Illustrated. Cloth binding, board covers. Price, \$3.00.

Revised and enlarged to include recent developments in effective time-study procedures and applications, this volume contains practical information of help to foremen, supervisors, and

union leaders desiring to know how to use timestudy as a tool to improve job performance and increase production per man per hour. The book explains what to do in starting a timestudy, describes how the time elements involved can be recorded, and emphasizes the necessity for comparing several such studies before setting standards of performance. The compilation of results of timestudies and the proper

charting of them so as to arrive at standards are thoroughly explained with appropriate diagrams and instruction. Descriptions of four basic types of wage incentive plans developed as a result of timestudies are also included.

Throughout the book, the author emphasizes ways and means of securing and retaining the cooperation of operators whose take-home pay is directly affected by the wage incentive plans which have been adopted as a result of such timestudies. The final chapters of the book contain many valuable and important pointers on how a foreman can, on his own, improve job methods and how he

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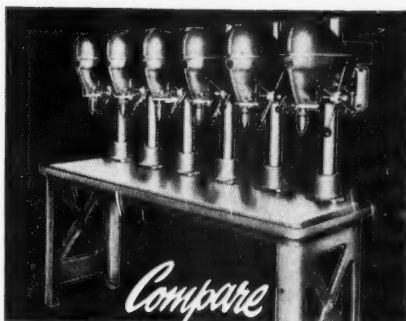
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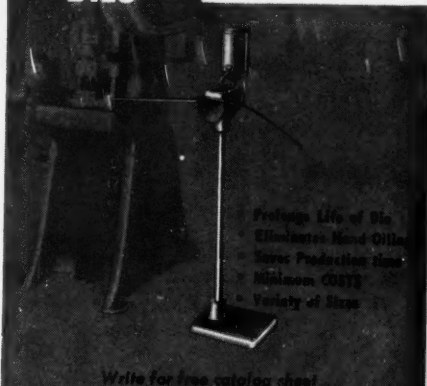
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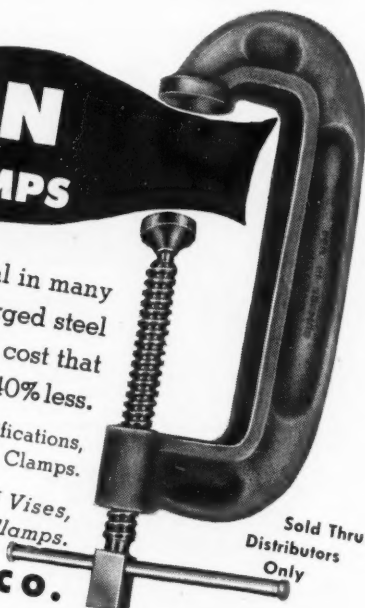
can prepare himself for promotion. Numerous self-test questions, cartoon-type illustrations, and simplified diagrams are presented in this clearly written primer, all designed to emphasize the key features involved in making and interpreting timestudies.

Materials Handbook. Seventh Edition. By George S. Brady. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y. 913 pages. Cloth binding, board covers. Price, \$8.50.

Information on more than 8,800 materials is presented in this practical volume, which has been expanded to include almost 4,500 more materials

than contained in the previous edition. The book now supplies a wealth of facts and figures to simplify the estimating, specifying, and purchasing functions in product manufacturing and processing.

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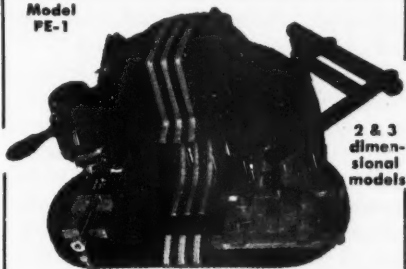
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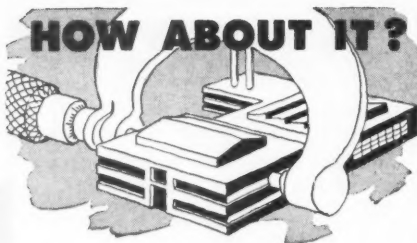
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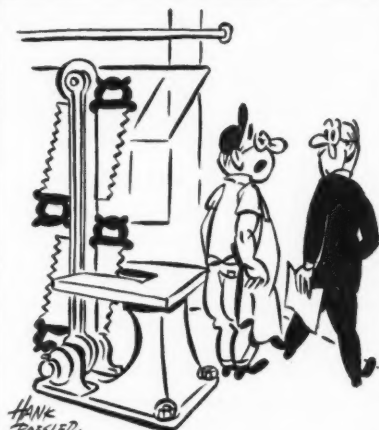
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acteristics of materials reflect the most common usage among manufacturers and other competent authorities.

Part II contains numerous charts, maps, and tables on the world distribution and production of the materials of industry, accompanied by authoritative interpretations and analyses. It is designed to provide economic-geographic information that is essential background for industry's intelligent, effective planning for and designing and purchasing of the materials it uses.

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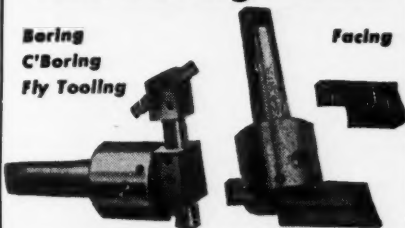
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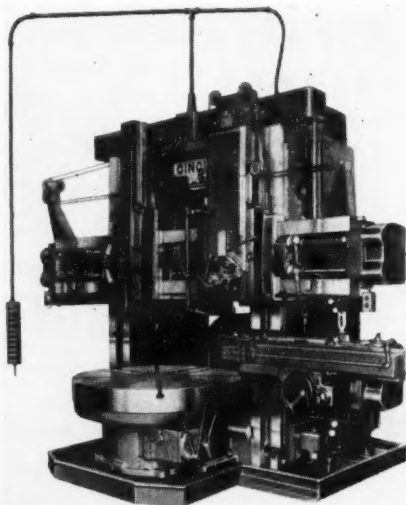
New Shop Equipment

Design Improvements Add to Machining Accuracy and Capacity of Vertical Boring and Turning Mills

Ten important design improvements in its 54-inch, 64-inch, and 6-foot heavy Cincinnati Hypro Vertical Boring and Turning Mills which are said to add to machining accuracy and overall work-handling capacity have been announced by Giddings & Lewis Machine Tool Co., Fond du Lac, Wis. These built-in structural features include non-metallic bearings for ram and saddle; independent traverse motors for rail and side heads; swivel type pendant control; helical rack and pinion on the ram; clearly marked feed controls; anti-friction bearing table transmission; new 16-feed gearbox; table anti-friction thrust and load bearings; two arrangements of mechanical change gear drives; and three electrical arrangements for single shift drives.

The improved bearing arrangement for the ram and saddle is said to ensure precision operation under the severest service. The individual motors for the rail and side heads of the machines are arranged to assure positive power. The pendant station is readily accessible to the machine operator and can be easily swiveled to any likely work position near the rail and side heads. The sturdy con-

Cincinnati Hypro Vertical Boring and Turning Mill with built-in design improvements



**Bullard Horizontal
Boring, Milling, and
Drilling Machine**

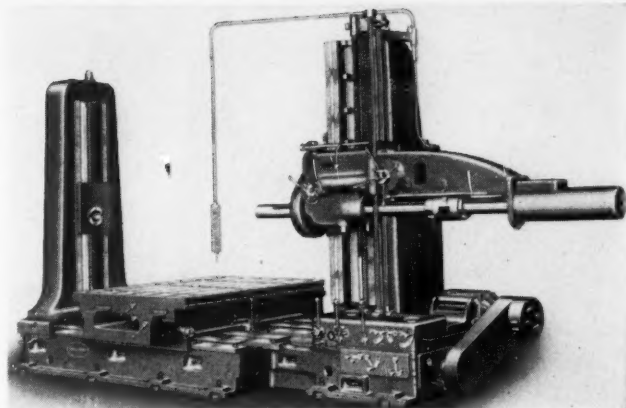
struction of the rail heads mounted on an extra long full bearing swivel and saddle is said to provide unusual rigidity at any point of ram travel.

Selective positions for the 16 feeds of each machine are clearly marked on each head control unit. Ram and saddle movement is completely independent. The table transmission case is an integral part of the sturdy one-piece machine bed. Shafts of the gear train are rigidly supported by heavy cast bed sections, and anti-friction radial and thrust bearings are used on all shafts. A new feed box provides 16 feeds from 0.003 to 0.500 inch on 54 and 64-inch machines and feeds from 0.004 to 0.750 inch on 6-foot or larger machines. A large anti-friction taper roller bearing is used to offset table radial thrust and a heavy duty roller bearing track is employed to support the table and load.

Two arrangements of mechanical change gear drives are available. In the 16-gear change main drive, table variation is obtained through 16 mechanical gear changes. Power for this drive is obtained through a 1,200 r.p.m. 50 or 60 h.p. a.c. motor. A similar mechanical main drive but having four gear changes requires a 40 to 50 h.p. adjustable 3-to-1 speed d.c. motor for table speed variation. With the 3-to-1 heavy duty adjustable voltage drive, table speeds from 20-to-1 in two separate ranges are possible. The 6-to-1 extra heavy duty adjustable speed drive also has infinitely variable table speeds from 20-to-1 in two separate ranges. A third arrangement includes a 6-to-1 adjustable speed direct current drive.

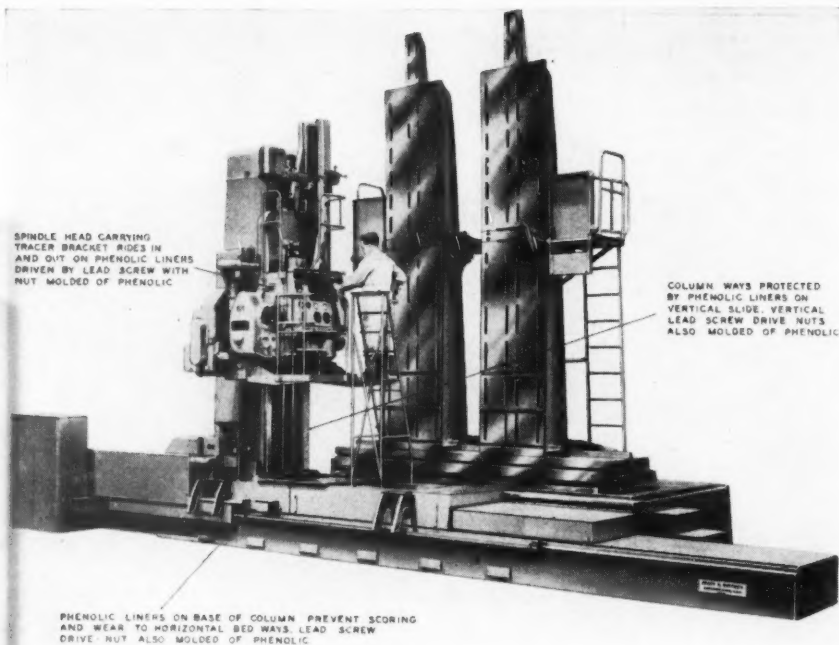
**Horizontal Boring, Milling, and
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5-Inch Spindle Sizes**

A four-way bed horizontal boring, milling, and drilling machine is now being offered in 4 and 5-inch spindle sizes by



The Bullard Co., Bridgeport 2, Conn. Said to assure a high degree of productive ability with maintained accuracy, the heavy box type bed supports equally on its four ways an unusually heavy well-ribbed box type saddle and table. Bed ways are covered by stationary sheet metal guards as a protection from chips and other foreign materials. Non-metallic bearing surfaces are used under both saddle and table to provide long-wearing replaceable bearing surfaces. The saddle guide and feed screw is located between the inner bed ways, minimizing any cocking tendency due to uneven load distribution. Single lever self-equalizing clamps acting on the outside of the outer bed ways provide a maximum hold-down effect. Table cross-feed nuts revolve in preloaded anti-friction bearings and are adjustable for wear. Lubrication pumps provide filtered oil under pressure for gears and bearings, and the large reservoir of the machine is said to permit ample cooling of the lubricant.

The machine is equipped with an improved type of hydro-dynamic coupling (fluid drive) and brake motor, driving through multiple V-belts. This type of drive is said to assure smooth, positive acceleration and stops and to absorb shock induced by interrupted cuts in heavy work. A safety pendant control with functional push buttons is said to protect the operator and provide for ease of operation. The 4-inch spindle machine has a range of 24 speeds from 8 to 1,000 revolutions per minute, while the 5-inch size unit has 24 speeds which range from 7 to 850 revolutions per minute.



P & W Keller Type BG-22 Tracer-Controlled Milling Machine with phenolic bearing surfaces on all sliding parts

Phenolic Bearing Surfaces Incorporated in Heavy Tracer-Controlled Milling Machine

Identified as the P & W Keller Type BG-22, a heavy tracer-controlled milling machine produced by Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford 1, Conn., incorporates phenolic bearing surfaces on all sliding parts to minimize wear. Laminated phenolic plates, sliced edgewise for end grain surface, are fastened to the slides of the column base, vertical slide, and spindle head, the movement of which provides the horizontal, vertical, and traverse motions of the machine. These plates are fastened securely to the castings with phenolic pins and the surfaces are then planed and precision scraped to their mating surfaces to the same limits of accuracy as were the previous cast iron bearings. The lead screws which drive these heavy members are also protected by phenolic, the nuts being molded of phenolic material which, it is claimed, provides for a positive contact fit that

will not pick up and freeze.

The Keller BG-22 is designed to operate at rapid traverse speeds up to 250 inches per minute and, with complete phenolic bearing protection, is claimed to assure continuous high speed operation over long periods of use without loss of accuracy.

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Tarbonis Cream for combating the many forms of occupational skin irritations is now being marketed by The Tarbonis Co., Dept. MMS, 4300 Euclid Ave., Cleveland 3, Ohio. The cream is recommended for skin irritations resulting from cutting oils, solvents, coolants, abrasives, acids, alkalies, dyes, plastic resins, glues, and other materials.

Tarbonis includes a vanishing cream vehicle which is rubbed into the pores of the skin and which is said to quickly alleviate the discomfort of irritations. Neat and clean, the cream can be applied to the hands while on the job without interference with the employee's work.

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Construction features include: capacity $\frac{3}{8}$ " to 1" in steel and $\frac{1}{8}$ " in softer materials; powerful friction clutch, exclusive spline drive to tap holder spindle; ball and needle bearings; rigid lightweight "TRU-GRIP" tap holder; helical back gear reversing mechanism; lightweight aluminum housing and many other unusual advantages.

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Gentlemen: Please send me full details on the new Procnier "TAP KING" Heavy Duty Tapping Attachment.

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Designated as the No. 869, a combination hardening and tempering furnace with Huppert Infitrol and electronic control and designed to afford the operator automatic control of temperatures ranging from 300 up to and including 2,200 deg. F. has been announced by K. H. Huppert Co., 6841 Cottage Grove Ave., Chicago 37, Ill. The furnace, which is 8 inches wide x 6 inches high x 9 inches deep with a maximum current consump-



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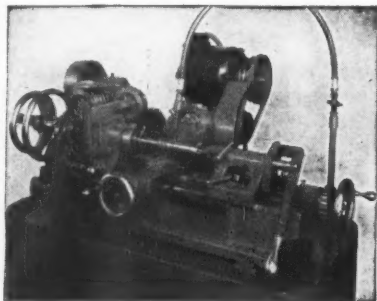
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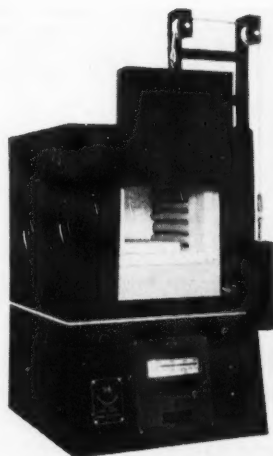
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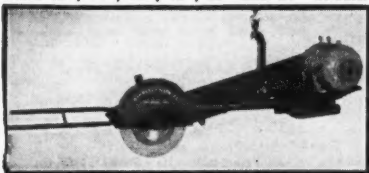
Huppert No. 869 Combination Hardening and
Tempering Furnace

tion of 4 kw., is wired for 220-volt single-phase operation and is provided with an easy-to-operate counterweighted door which rides in a wedge slide to seal the door in the closed position. Of sturdy construction, the unit includes heating elements made of non-scaling non-flaking high temperature coiled alloy wire, and features a multi-insulation design to provide for full heat retention. All contacts are fully enclosed, and the furnace is supplied ready for operation.

Built as a No. 869-FM floor model and No. 869-ACB bench model, the furnace is also available in a model, designated as the No. 869-EMIF, using the Huppert Infitrol and an indicating pyrometer. In this case, the low temperature range is raised to 1,000 deg. F. in place of the 300 deg. F. which is obtained with the use of the Huppert Infitrol and electronic controller.

MUMMERT-DIXON SWING FRAME GRINDERS

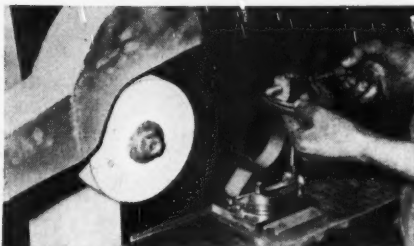
Sizes 12", 14", 16", 18", 20" and 24" wheels.



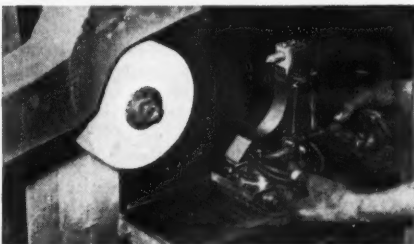
Ask for Descriptive Circular
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120 Philadelphia St. • Hanover, Pa.

HOW A J & S "Fluidmotion" WHEEL DRESSER cut production costs FOR THE ADAMAS CARBIDE CORPORATION

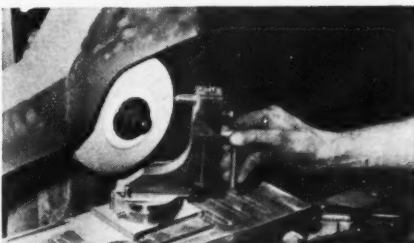
Paul C. Boniti, Shaping and Forming Supervisor of the Adamas Carbide Corporation, Harrison, N. J., reports that his standard Model "E" J & S "Fluidmotion" Wheel Dresser has



1 To set-up for convex radius, first mike distance from diamond point to micrometer plate, then add radius desired. (For concave radius, subtract).



2 Slide dresser in dust-proof channel till mike slips over pins as shown and lock with socket wrench. Dresser is now ready for action.



3 Bring diamond point up to center line of wheel, rotate dresser on swivel base in one continuous motion. A clean, accurate radius results! No chatter marks.

OTHER "Machine Shop TIME SAVERS" by J & S
J & S "All-Purpose" Jaw Clamps, KOALA Circular Cutting Tool,
"Down-Held" Vise Jaws, and "Attachable" Parallels. Write for
"Time Savers" Booklet.

*Reg. U. S. Pat. Off.

- Cut set-up time
- Cut dressing time
(save on diamond and wheels)
- Cut maintenance cost

In 4½ years grinding presintered carbide has cost \$17.50 to maintain — less than \$4.00 per year.

HOW "Fluidmotion" saves time is demonstrated at left. Photos taken at Adamas Carbide show how a concave or convex radius—accurate to .0001" can be obtained in three simple steps.

Dressing two angles tangent to a radius is simple. Only one more step is necessary. After radius is set (steps 1 and 2) the dresser is swung on its graduated base to first one angle, then the other, and both are locked in with a turn of the knurled knob. Actual dressing is again accomplished in one continuous motion—it is not necessary to move the dresser on dove tails to form the angles.

It is important in our work to have a rigid dresser that can dress a wheel true consistently, leave no chatter marks, and still not have the abrasive content in the presintered material affect the accuracy of the dresser. This I can personally vouch for. J & S "Fluidmotion" in 4½ years has passed this test. I have complete confidence in "Fluidmotion"—no trial and error in order to obtain accurate forms. Our company has enjoyed the lower production cost made possible by "Fluidmotion's" repeated accuracy and ruggedness. It's a cinch to do our grinding jobs.

Adamas Carbide, well known for its high quality, low cost carbide blanks, attributes a fair share of its success in attaining more efficient production to its J & S "Fluidmotion" Wheel Dresser.

You, too, can also cut production costs by employing the J & S "Fluidmotion" Dresser in your tool room.

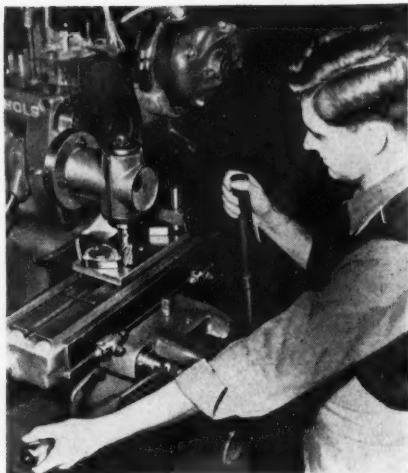
Application to any surface or cylindrical grinder is quick, simple. Set-up and dressing time is yet the lowest to be found.

Wheel Dressers made to dress wheels accurately up to 36" in diameter, and designed to meet your grinding requirements.

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Representatives in Principal Cities

Attachment Adapts Horizontal Millers to Diversified Vertical Milling Operations

Nichols-Morris Corp., 50-H Church St., New York 7, N. Y., is now distributing a vertical milling attachment which is designed to quickly adapt standard horizontal Nichols millers to precise diversified vertical milling operations. Constructed to accommodate a full 1 h.p. drive with maximum speeds up to 2,000 r.p.m., the attachment consists of a heavy one-piece casting which houses the entire mechanism. Accurately machined align-



Nichols Miller equipped with Vertical Milling Attachment for use in performing profiling operation

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DIVISION OF WEST COAST AERO TOOL CO.
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ment pads on the body casting allow for easy mounting in a true vertical plane. The hardened and ground drive shaft is mounted in precision double-row ball bearings and the vertical spindle in zero precision Timken bearings at both ends. The vertical spindle nose is identical with the horizontal spindle nose (bored No. 40 National Standard taper) and thus will allow for the interchange of tooling. A standard drawbolt is furnished, and a draw-in collet attachment is available on order.

The vertical attachment is mounted in a circular T-slotted adapter plate which encompasses the horizontal spindle nose, and is held firmly in place by four bolts. The attachment may be swiveled around the horizontal spindle if desired, suitable

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50	.070	180	66	.012	Cro.
51	.055	120	56	3-32	180
52	.055	150	57	4-32	180
53	.040	180	58	7-32	150
54	.030	200	59	9-32	150
55	.018	200			

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ly, gives you more holes per grind.



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graduations in degrees being provided, and is driven through a splined adapter in the mouth of the horizontal spindle. Spindle speeds of the vertical attachment are one-third higher (4:3 ratio) than available horizontal spindle speeds.

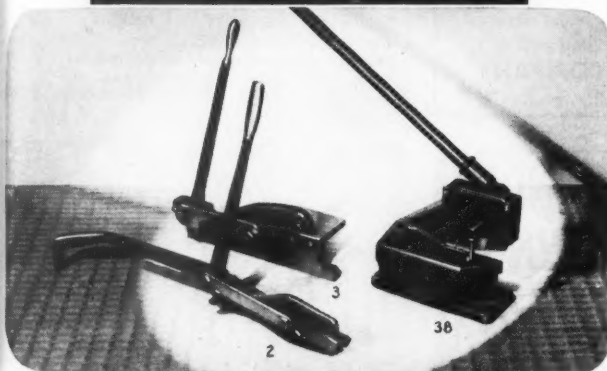
Hydraulic Presses Have 5 and 8-Ton Capacities

Two new hydraulic presses of 5 and 8-ton capacities have been announced by Hannifin Corp., 1186 S. Kilbourn Ave., Chicago 24, Ill. Offered as a complete unit with built-in reservoir and with motor and pump mounted inside the frame,

each press is applicable to forming, bending, trimming, staking, riveting, and press-fit assembly work on production lines, as well as general purpose or utility service when installed singly in large or small shops. Designated as the F-50A (5-ton) and the F-80 (8-ton), the presses are also available with larger motors and pumps and consequently higher ram speeds. Single manual lever control is a standard feature of each press; however, dual manual levers and electric push-button control are both available.

An advantage of each press that is said to make it particularly desirable for repetitive production operations is the fact that the stroke can be shortened by limiting the return stroke to the point where the ram just clears the work.

WHITNEY METAL TOOL COMPANY 39 YEARS EXPERIENCE



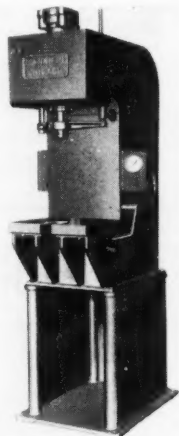
WHITNEY-JENSEN HAND and BENCH SHEARS Nos. 2, 3, 38

The No. 2 Hand Shear is especially useful when cutting large sheets from stock. Capacity: 1/8" mild steel. Weight: 11 lbs.

No. 3 Shear is an easy-working, clean-cutting tool that cuts flats as well as rounds. Capacity: mild steel, Flats—1/8"; Rounds—1/8", 3/16", 1/4", 5/16".

No. 38 Throatless Bench Shear will split or shear sheets or flats of any dimension. Capacity: 3/16" mild steel.

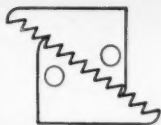
WHITNEY METAL TOOL COMPANY
110 FORBES STREET, ROCKFORD, ILLINOIS



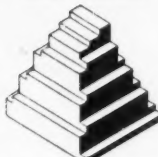
Hannifin Hydraulic Press with base for floor mounting

thus wasting no ram motion and, therefore, no productive time. The actual force exerted by each press can be adjusted anywhere in the range between 10 and 100 per cent of maximum capacity. Each press can be obtained with a base for floor mounting or without a base for bench mounting.

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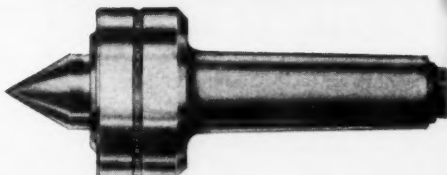
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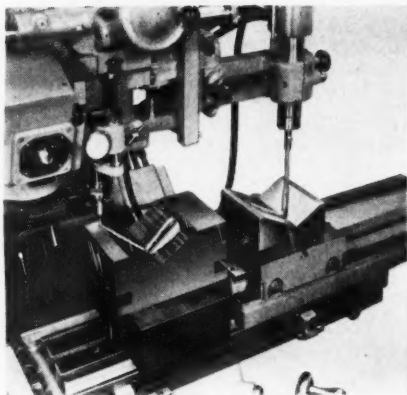
Bridgeport 8, Conn.

Export Dept.: 21 West St., New York 6, N. Y.

Attachment Designed for Milling Right or Left-Hand Dies from Masters of Opposite Hand

A reverse image attachment for its vertical Hydro-Tel type milling machines has been announced by The Cincinnati Milling Machine Co., Cincinnati 9, Ohio. The attachment is employed for milling right or left-hand dies, molds, and hobs from masters of the opposite hand. Thus, with only one master, both right and left-hand matching halves of a die can be milled to perfect symmetry, the manufacturer claims.

The attachment is available for three Cincinnati milling machines; namely, 8 x 18-inch tool and die miller, 16-inch vertical Hydro-Tel, and 28-inch vertical Hydro-Tel. All sizes of the attachment function in the same manner. Designed for mounting on the machine table at the right-hand under the vertical depth control unit, the attachment consists of a rigid supporting base which carries an auxiliary table on anti-friction rollers. At the rear of the attachment, a pair of matched racks, one on the supporting base and one on the auxiliary table, is engaged by a gear which is supported by a fixed bracket. The gear acts as an idler between the two racks, translating move-



Reverse Image Attachment set up for milling golf club dies on a Cincinnati 8x18-Inch Tool and Die Miller

ment of the machine table to movement of the attachment table in the opposite direction. Therefore, a master shape mounted on the auxiliary table is reproduced in the die block but to the opposite hand.

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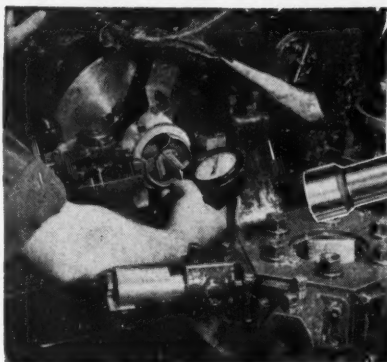


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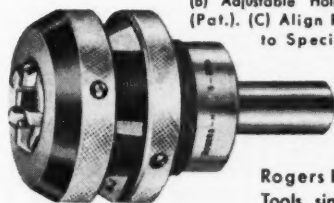


ROGERS TOOLS



A

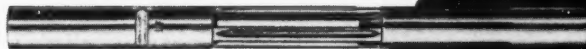
(A) Adjustable Blade Reamers.
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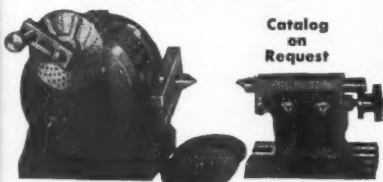
Power Hack Saw Has 6 x 7-Inch Straight Cutting Capacity

Identified as the "Sawmaster" Model No. 3167, a portable power hack saw with 6 x 7-inch straight cutting capacity and 4-inch capacity at a 45-degree angle has been introduced by Miller-Knuth Mfg. Co., Omaha, Neb. Designed to cut on the "push stroke" instead of the "pull stroke," the machine features a redesigned back plate consisting of a casting which contains two sizable bronze bear-



"Sawmaster" Model No. 3167 Portable Power Hacksaw

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96 Silliman Ave. Bridgeport 5, Conn.

ings and can be easily adjusted without removal. The unit also features a saw frame which provides for an efficient method of fastening the blade in the frame and is said to keep the blade absolutely straight and rigid, thereby ensuring straightness of cuts and also permitting the use of a maximum portion of the blade on large cuts.

The design of the Sawmaster Model No. 3167 also includes a sturdy quick-acting vise which permits rapid clamping of stock in the jaws. Both the front and rear jaws have milled surfaces to ensure the firm holding of stock. In addition, the machine is equipped with a saw frame support having an automatic catch and release. If desired, the machine can be used for wet cutting by the installation of available coolant equipment.

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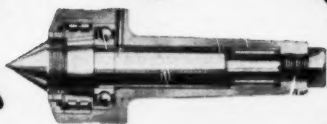
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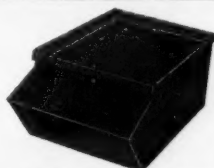
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Size: 18" x 12" x 6".

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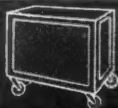
Once you use and compare Sterling stacking boxes, you'll know why we invite comparison in design, construction, and price. Our "Top Rim" construction provides stronger support all around the box . . . no corner inserts to become loose and fall out. Efficiency in designing and manufacturing allows us to quote favorably on any type or size stacking box.

Write for literature and prices.

Sterling Factory Equipment Co., 183 Charles St., Providence, R. I.



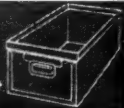
Sterling "Top Rim" Steel Stacking Box with drop handles.
Size: 18" x 12" x 6".



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Quality Handling & Storage

Equipment



Adhesive Backed Felt Tape Can Be Rapidly Applied

A reinforced felt tape with a pressure-sensitive adhesive back, to be known as Kling Felt, has been announced by Products Research Co., 5426 San Fernando Rd., Glendale 3, Calif. The tape, it is claimed, does not require a paper or other separation material between layers and, as a consequence, can be applied very rapidly.

Uses for Kling Felt include rattle and squeak deadening; sealing against dust, wind, fumes, and foreign materials; as a thermal insulator; for vibration and shock cushioning in fragile crating and on machinery; for scratch protection, and many other protective applications. Finger pressure is said to make the tape stay put in overhead and vertical positions until forcibly removed. Kling Felt is available in rolls from $\frac{1}{4}$ to 66 inches wide and in thicknesses of $\frac{1}{16}$, $\frac{1}{8}$, and $\frac{1}{4}$ inch (100 feet long), $\frac{1}{8}$ inch (50 feet long),




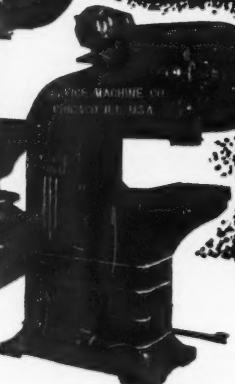
Illustration showing manner in which Kling Felt can be rapidly applied

and $\frac{1}{4}$ inch (25 feet long). It is also available as a cut gasket, die-cut to specifications.

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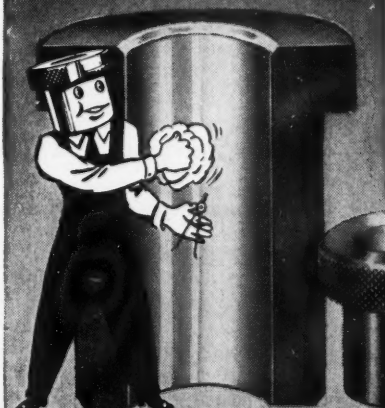
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Chicago "Safety Plus" products are designed to give you a tighter, lower cost fastening for any heavy duty purpose. To speed delivery time, call the **INDUSTRIAL SUPPLY DISTRIBUTOR** nearest you today. Ask for Chicago and get "Safety Plus."

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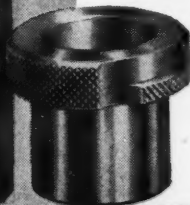
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Speed Reducer Applicable to Drilling, Tapping, and Reaming Operations

The Newman Speed Reducer, a multiple speed attachment for use in drilling, tapping, and reaming operations, is now being marketed by Louis Newman Machinery Co., Dept. M, 8-10 Stearns Square, Springfield, Mass. Said to be of particular value for use with multiple

spindle drills, the attachment is available in a single style, designated as the Model 1-C, which is designed to reduce the

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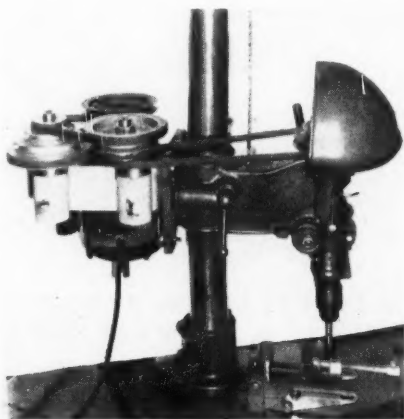


Illustration showing Newman Double Speed Reducer in operation

HAND TAPPING
with
MACHINE PRECISION

Adapts for LATHE USE



59⁵⁰
F. O. B.
ST. PAUL

Just slip a tap adaptor into the Dahlstrom Tap Guide and twist. Your hand tapping will be quick and accurate. For machine tapping, the spindle top is center-bored to fit the tail stock center of a lathe. Size 13" x 8" x 14". Included 9 adaptors (8/32 to 3/4"). Taps not furnished. Dahlstrom Mfg. Co., 2522 W. Larpenteur, St. Paul 8, Minn. Write for Pamphlet—Also Shows Chucks & Autostops.

Dahlstrom TAP GUIDE

spindle speed of a motor of 1,725 r.p.m. to approximately 270 r.p.m., and in a double style, designated as the Model 2-C, which is said to reduce the spindle speed of the same motor to 100 r.p.m. The shipping weight of the Model 1-C is 9 lb. and of the Model 2-C, 15 pounds.

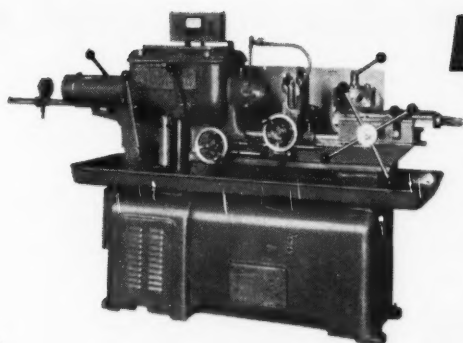
Applicable to virtually any standard American-made motor up to 3/4 h.p., the Newman Speed Reducer is attached simply by bolting to the motor base and is said not to interfere in any way with the up and down movement of the drilling head. An eccentric permits convenient, rapid adjustment or changing of the belt of the unit.

STRAINCO-METEX MODEL "C"
Coolant-Cutting Oil STRAINERS

\$5.80 each
 Up to 10 g.p.m.



STRAINER PRODUCTS CORP.
 PATERSON — R.D. 4 • NEW JERSEY



HERE IT IS!

The new Simmons No. 2 Turret Lathe, offered to you with three distinct advantages:

- Low Cost
- High Precision
- Early Delivery

Plain or Back-Geared — Forged steel spindle with anti-friction precision bearings, friction clutch and brake. Spindle nose, $2\frac{3}{8}$ "-8.

$1\frac{1}{4}$ " bar capacity—14" swing over ways. Micro-Speed Drive offers infinite speeds — plain, 375 to 1500 RPM; back-geared, 44 to 750 RPM — for bar or chucking work. Power feed to turret.

• Write today for complete details.

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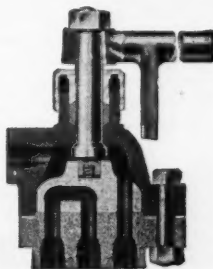
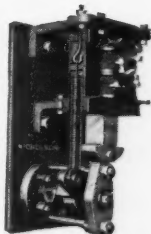
1745 North Broadway, Albany 1, N. Y.

N. Y. Office: 50 East 42nd St.

Nicholson Control Valves

SET RECORDS for LONG LIFE

In a wide range of plants—steel, metal working, processing, etc. — Nicholson cylinder control valves have now been in constant use for over 25 years. Their capacity for longer leak-free service is confirmed by many installation records which show Nicholson valves actually become tighter with use. This is because their flat discs tend to lap themselves on the seats.



Nicholson stand-ard and special valves in lever, foot, solenoid, motor types; for air, gas, oil, steam, water; size $\frac{1}{4}$ " to $2\frac{1}{2}$ " ; press. to 5000 lbs. CATALOG 1250.

W. H. NICHOLSON & CO. 136 OREGON STREET
VILKES - BARRE, PA.

Steam & Air Traps • Control Valves • Expan. Mandrels • Arbor Presses • Welded Floats

Attachment Is Designed for Production Tapping

A lead screw tapping attachment offered by Automatic Methods, Inc., 42 Walnut St., Room 188, Newark, N. J., is described as a precision unit which enables any operator, skilled or unskilled, to accurately perform production tapping with no danger of damaged threads. The attachment consists of a support arm, support arm clamp, support arm screw, support arm washers, lead screw, split nut, split nut mounting screws, split nut washers, lock assembly, Jacobs Rubber-



Lead Screw Tapping Attachment applied to drill press

XPEDITORS
GUARANTEED TO
SAVE YOU TIME

- ★ on clean up job
- ★ production
- ★ in semi-automatic machines

The XPEDITOR is the latest development in portable, high speed abrasive belt grinders. Instantly adjustable to any angle to give operators full view and control . . . swivels 360°. Equipped to do line contact, free belt and precision platen grinding and contour polishing. Speeds deburring and clean-up jobs; also used with jigs or fixtures or automatic feeding as a production unit . . . guaranteed to increase productivity. Write for bulletin.



flex collet and nut. The split nut and lead screw are interchangeable for different threads so that a variety of threads may be precision tapped. The assembly is provided as a support arm attachment for any standard drill press.

Designed to accommodate taps of all standard sizes ranging from 0 to 1/4 inch without changing the collet, the unit is available in sizes to fit 14 to 15-inch drill presses having a 2 3/4-inch diameter column. Lead screws and nuts are offered in the following pitches: 20-24-28-32, 36-40-44-48, 56-64, 72-80.

Power Hack Saw Handles Materials up to 6 3/4 x 6 3/4 Inches

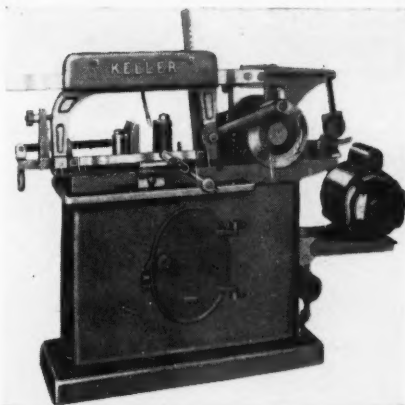
Designated as the Keller Model No. 3CH, a heavy duty power hack saw an-

Avey AUTOMATIC INDEX TABLE Meets Demand for DRILLING and TAPPING EQUIPMENT

Write for Literature or nearest Agent

Sizes 16", 20", 24", 30", 36" Tables Interchangeable. 4 to 18 Indexes. Entire Unit Self-Contained. Built on Unit Construction Principle. All Drive and Control Mechanisms underneath Table for Free Work Surface • Easy Accessibility

THE **Avey** Drilling Machine Co., Cincinnati 1, Ohio



Keller Model No. 3CH Heavy Duty Power Hack Saw

nounced by Sales Service Machine Tool Co., 2355 University Ave., St. Paul 4, Minn., has a 6-inch stroke, built-in coolant tank in the base, and Oilite bearings, and is furnished complete with a $\frac{1}{2}$ h.p. single or three-phase motor as standard equipment. Said to handle up to $6\frac{3}{4}$ x $6\frac{3}{4}$ -inch materials, the machine is equipped with a swivel vise, automatic feed system, and automatic stop, and is designed to accommodate either 12 or 14-inch blades. Two speeds, 70 or 125 strokes per minute, are available.

Automatic Proportioning System Blends Two or More Liquids

An automatic proportioning system for blending two or more of a wide variety of liquids has been developed by Bowser, Inc., Fort Wayne, Ind. No charts or calculations are used to set the blender

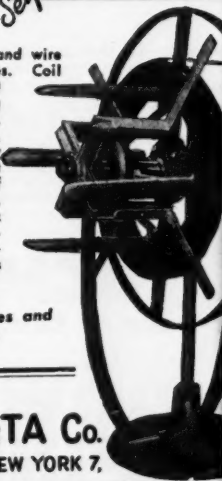
for any combination of liquids. Simple controls on each meter permit instantaneous setting of ingredient proportions in increments to meet the user's exacting needs. Total throughout is recorded on a master counter, and each ingredient is recorded separately on its own meter.

The master counter is available with a predetermining device and/or ticket printer, and the meter for each ingredient is available with a standard counter or ticket-printing unit. Failure of any ingredient supply provides for automatic shutoff of the entire system and, if the supply to any meter slows down for any

WESTLEN REELS

*Adjustable
Self Centering*

For feeding strip and wire coil stock to presses. Coil capacity 300 to 500 lbs. Outside ring dia., 28" to 36". Height of reel, 36". Wheel automatically adjusts parts to suit inside diameter of coils from 11" to 20". Arm allows for quick conversion to horizontal or vertical position and adjusts height of reel.



Write for prices and literature.

The RULETA Co.
27 WARREN ST. NEW YORK 7.

Avey AUTOMATIC UNITS for DRILLING • TAPPING

REAMING • HOLLOW MILLING and DEEP HOLE DRILLING

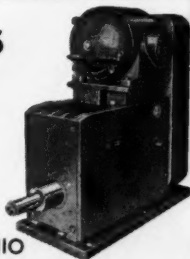
Vertical, Horizontal or Angular Mounting.

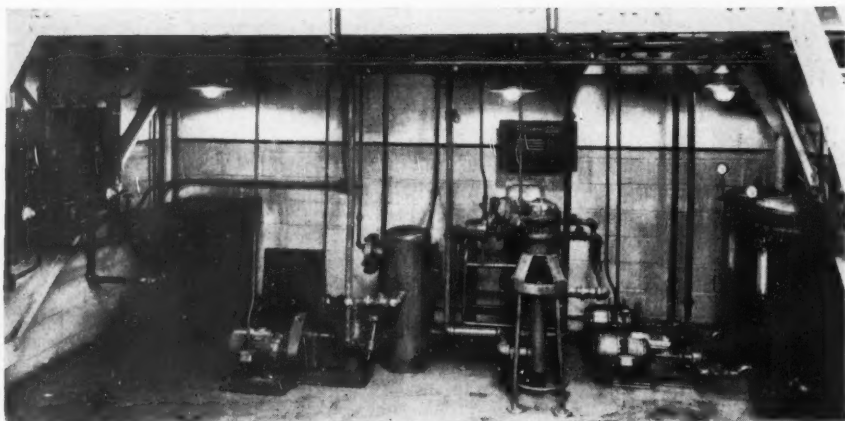
Made in two sizes . . . No. 1 & No. 2 Morse Taper.

Here's a packaged unit . . . that will simplify your

HIGH PRODUCTION PROBLEMS. Write for details.

THE Avey DRILLING MACHINE CO., CINCINNATI 1, OHIO





Bowser Automatic Blender Installation

reason, all meters synchronize automatically to the same rate of delivery. All measurement is effected by accurate, positive volumetric displacement, and any number of ingredients may be blended. If the number of ingredients is

reduced at any time, one or more meters may be made inoperative.

Dials and gages are all visible from the outside of a cabinet which encloses the entire blender. The unit is dust-resistant and can also be equipped for operation in

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ACME
RED OR BLUE LABEL
PRECISION
**DOWEL
PINS**

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SAFEGUARD

EXPENSIVE DIES AND
MACHINE PARTS

Acme Dowel Pins break before bending or mushrooming—thus saving expensive equipment from ruin through misalignment. Order standard sizes from stock. Attractive prices on special sizes and large quantities.

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Makers of Standardized Jig & Fixture Bushings

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MARVECO *Live Centers*

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- HIGH SPEED

MARVECO is the time-tested live center with unlimited capacity—50 pounds to 50 tons—guaranteed to outperform and outlast any other live center. You can depend on MARVECO for trouble-free production.

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Screws

Socket
Set Screws



Try Them On Your Next Job!

**ECONOMY
MACHINE PRODUCTS
COMPANY**

5212 Lawrence Ave., Chicago 30, Ill.

What TO DO TO SAVE SET-UP TIME

Much time can be saved in making set-ups for tapping and reaming by simply using a Ziegler Floating Tool Holder instead of an ordinary tool holder. Here's why!

With ordinary tool holders the work must be aligned very accurately with the spindle. This requires considerable time. But with the Ziegler Holder it is sufficient if the work is aligned within 1/32" of center on the radius (1/16" of center on the diameter). The Ziegler Holder automatically compensates for the difference.

Thousands have proved this to their own satisfaction over a long period of years. Why not try it and see!



Types to fit any machine used for tapping or reaming

Ziegler
ROLLER
DRIVE

FLOATING HOLDER
for Taps and Reamers...

W. M. ZIEGLER TOOL CO.

13566 AUBURN
DETROIT 23, MICH.

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CATALOG

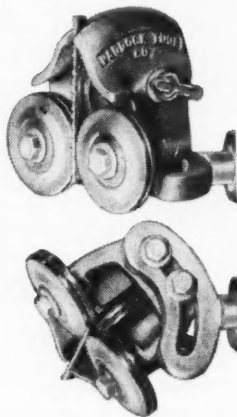
corrosive atmospheres. Blending systems for almost any combination or quantity of liquids are achieved on a production basis by making the cabinet in sections which accommodate various types and sizes of stock meters.

The Bowser Automatic Liquid Blender is said to be ideally suited for use by metal-working plants for obtaining correctly blended coolants and cutting oils. An outstanding advantage claimed for the system is the elimination of the need for large storage facilities for, and inventories of, blended stocks and double pumping. Liquids can be blended as re-

quired and placed directly in storage, tank cars, or containers.

Guide Holds Saw Blade at Any Desired Angle

Paddock Tool Co., 1418 Walnut St., Kansas City, Mo., has announced a ball-bearing band saw guide, designated as



Paddock Model 20 Band Saw Guides

the Model 20, which is designed to hold the blade at any desired angle. The three ball-bearing wheels in the guide are said to reduce the danger of saw blade breakage by supporting the working portion of the blade.

When a 36-inch band saw machine is equipped with the Model 20 guide and the blade held at an angle of 45 degrees, material can be cut to any length. The guide is easily adjusted to the width, thickness, and desired angle of the blade.

CAMS

Our ROWBOTTOM cam cutting facilities are at your disposal for your cam requirements.

We Solicit Your Inquiries.

BLOOMFIELD TOOL CORP.

37 FARRAND ST.

BLOOMFIELD, N. J.



CONTINUOUS HINGES

Manufactured by

**AUTO MOULDING
& MFG. CO.**

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CHICAGO 19



"SHUR-GRIP" DROP FORGED HANDLES

Designed to hold 3 to 6 lb. lead hammer heads more firmly—will not slip—keeps hammer head in shape longer—to make remodeling easier, quicker, surer, less expensive. Write for folder.

LAWRENCE H. COOK, INC.

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Baldor

PRECISION GRINDERS

for close tolerance work

Grinder No. 1010 shown here is a rugged 130 lb. general service grinder with 36 & 60 grit 10" wheels. 3 phase, 1725 RPM motor will take plenty of overload and abuse. Will not burn out. Balanced wheels, dynamically balanced armature. Wide clearance between wheels and motor frame allows working on large or odd-shaped pieces.

Clip this ad to your letterhead and mail for Bulletin 321-E.

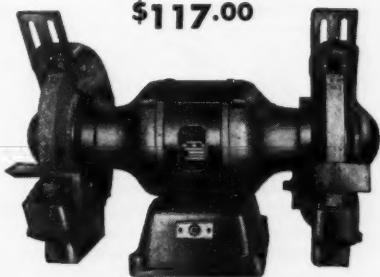
BALDOR ELECTRIC COMPANY

Motors - Grinders - Battery Chargers

4380 Duncan Ave.,

St. Louis 10, Mo.

\$117.00



BARKER

(Two-Jaw or Three-Jaw)

WRENCHLESS CHUCK

will pay for itself in 60 to 90 days on production schedules by giving MORE parts per hour at a LOWER cost per part. Most round parts can be set in the Barker Wrenchless Chuck without stopping the machine. It saves time, helps speed up production, and cuts spoilage where the run is continuous on turrets, engine lathes, cutting off machines, drill presses or any other type of chucking machine. The Barker Chuck shown here, replacing an ordinary 3-jaw chuck, jumped production

from 18 to 24 pieces per hour. It can do it in your plant too. Let us show you how!

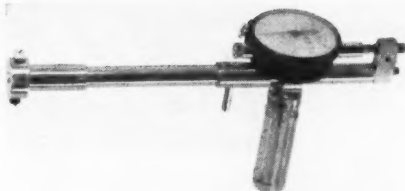
Write for bulletin 201 today



Chuck Division
THOMAS HOIST CO.
28 S. HOYNE CHICAGO 12

Internal Thread Comparator Is Simple to Use

Rimat Machine Tool Co., 1117 Air Way, Glendale 1, Calif., has developed an internal thread comparator which is designed to measure from the pitch line of any one thread in a "nut" to the pitch line of the two threads lying diametrically opposite it. When set to a basic ring gage, the comparator provides plus or minus deviations from the basic pitch. The indicator reading is in tens of thousandths, and, for any one setting, the instrument has a range of plus or minus 0.003 inch.



Rimat Internal Thread Comparator

Readily portable so that it may be used equally well at the machine or bench, the comparator, it is claimed, can be set to a ring gage in a few seconds, this setting automatically compensating for any wear of the comparator gaging members which contact the workpiece. Applicable for checking threads of all classes of fit, the instrument is available in sizes for measuring N.C. threads from $\frac{1}{2}$ inch-13 to 4 inch-4 and N.F. threads from $\frac{1}{2}$ inch-20 to $1\frac{1}{2}$ inch-12.



DRILL THESE HOLES

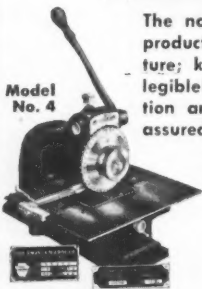
BY A QUICK, EASY, INEXPENSIVE METHOD

Your business letterhead will bring literature.

WATTS BROS. TOOL WORKS
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NAMEPLATE MARKING



Model No. 4

The nameplate on your product is your signature; keeps it neat and legible! Accurate location and alignment are assured with this

NAMEPLATE DETAIL PRESS.

- Simple Operation
- Perfect Alignment
- Uniform Depth

GEO. T. SCHMIDT, INC.



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CHICAGO • 13 • ILLINOIS

Metal-Working Coolant Lubricant Features High Stability

The availability of Emulsifier STH, a water-soluble metal-working coolant lubricant of high efficiency and stability for use in cutting, grinding, drawing, and stamping operations, has been announced by General Aniline & Film Corp., Product Development Dept., 22 Center Square, Easton, Pa. Based on a unique family of chemical compounds which are said to possess unusually good lubricating properties because of a high affinity for metals, Emulsifier STH is recommended for use with all types of metal-working machines which employ coolant recirculating systems properly sealed for handling water emulsions, including automatic chucking machines,

AT LAST!

A Low-Priced Dial Type Indicator

Contact can be instantly changed. Double faced. Simultaneous reading front and back.

Double faced dial indicator complete with plated holder including $1/32$ " and $1/8$ " contacts—

Black Pentrate	\$6.95
Satin Chrome	7.95
$1/32$ " Contact, $1/2$ " long extension	.75

SUPERIOR INDICATOR CO.
P.O. Box 734

Rochester 3, N. Y.



BROACHING TOOLS and FIXTURES

Complete engineering and manufacturing facilities for your broaching applications. Expert service for sharpening and reconditioning your broaches. Standard keyway broaches in stock.

We invite your inquiries—Send us your part prints for recommendations and quotation.

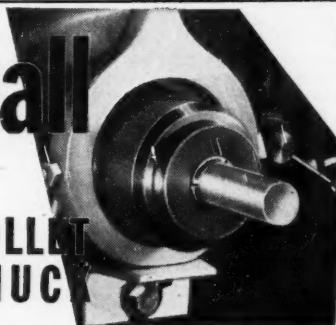
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CONANT Tool & Engineering Co.

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COLLET CHUCK



SPEED UP production in multiple operations with push-out type Hall Collet Chuck. Full spindle capacity or over. Tremendous grip over or under stock size to .007—without adjustments . . . no bearings, friction, heat or loss of power. Instant release without stopping lathe.

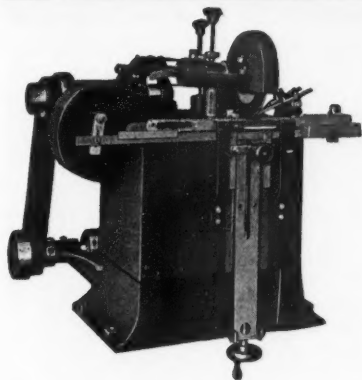
2-inch capacity, \$145; 3-inch capacity, \$295;

1-inch capacity, \$95

Round, square or hex collets, plain—serrated

HALL MANUFACTURING COMPANY

622 Tularosa Dr., Dept. B, Los Angeles 26



**WARDWELL EC Combination Grinder,
Hack, Circular and Band Saws**

The only single unit grinder adaptable for hack, band and circular saws that does not depend on the shape of the grinding wheel to form the shape of the tooth. This unique feature enables operator to grind a variety of blades without dressing or changing wheels.

**Re-sharpen hack saw
blades 6 times before
discarding saves
hundreds of dollars
yearly.**

Ordinary blades are junked after two or three sharpenings. EC resharpens them at least six times and thus can return its cost on blade purchases alone. Write for Bulletin EC. Wardwell Mfg. Co., 3166 Fulton Road, Cleveland 9, Ohio.



**Maker of largest line of
saw and tool sharpening machines**

hand screw machines, turret lathes, cylindrical and surface grinders, mechanical saws, drill presses, and milling machines. Drawing and stamping jobs can also be successfully performed by dipping the sheet in diluted STH before working, it is stated.

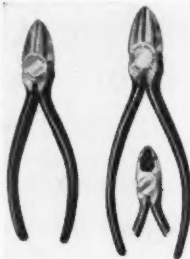
Claimed to have a wide range of usefulness with ferrous and non-ferrous metals and alloys, Emulsifier STH has been found to be especially effective for the cutting of very soft and very hard alloy steels. The material, which has rust-inhibiting properties to protect tool, machine, and work, is said to provide ex-

cellent lubrication in very dilute water solutions while retaining all the cooling effects of clear water.

Pliers Have Wide-Opening Jaws

Utica Drop Forge & Tool Corp., Utica 4, N. Y., has added to its "Lubring" line of self-lubricating pliers two new pliers which feature wide-opening jaws and maximum strength around the rivets. The new models are a 6-inch diagonal cutting pliers (No. 241) and a 6-inch diagonal cutting pliers (No. 242SW) with a

wire stripping hole in the blade and sleeve grooves or wire twisters with W-shaped stripped notches on the back of the head.

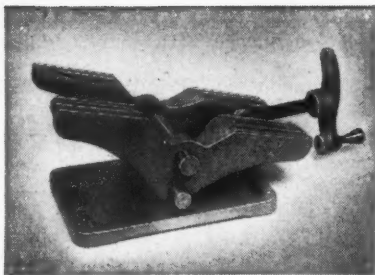


"Lubring" No. 241 (left) and No. 242SW Pliers

According to the manufacturer, the use of a round joint in each pliers provides for maximum bearing in the counterbore and consequently unusually high strength around the rivet. Said to be 20 per cent lighter in weight but equivalent in strength to previous models, the pliers are each distinguished by a ring of porous oil-bearing iron which rides in the joint. As the pliers are used, the ring emits oil, lubricating the pliers as oil is needed.

It's NEW! It's DIFFERENT! It's BETTER! **LOVEJOY TILTING MOTOR BASE**

Only
\$6.00
each



Pat. Pending

This new, low price tilting motor base is for fractional motors up to $\frac{3}{4}$ horsepower. Maintain correct belt tension or, when used with a variable speed pulley, desired speed is obtained simply by the handle screw adjustment. Adjustments may be made while the motor is running.

The Lovejoy Tilting Motor Base is adjustable in both width and length to accommodate all sizes and types of fractional horsepower motors. You can't afford to be without this sturdy adjustable motor base. ORDER YOURS TODAY!

Send for complete information on the entire Lovejoy line.

LOVEJOY FLEXIBLE COUPLING CO.

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CHICAGO 44, ILLINOIS

Also mfrs. of Lovejoy Universal Joints & Variable Speed Transmissions



6" and 15 mm.
scale
Hardened
Jaws

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0.1 mm vernier

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Guaranteed Accuracy

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381 Fourth Ave., New York 16, N. Y.

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GROBET CHATTERLESS COUNTERSINKS
Six staggered cutting edges give shearing
cut that eliminates all chatter.
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GROBET FILE CO. of AMERICA, INC.
421 Canal Street N. Y. 13, N. Y.

"MITI MITE" No. 100

The New, Amazing Magnetic Base Holder
for mounting Test Indicators to flat or curved surfaces
INSTANTLY!

ELIMINATES CUMBERSOME HAPHAZARD CLAMPING



Easily mounts to shaft. Magnetic pull app. 50 lbs.

Base size, 1" x 1 1/4".

Ball and socket swivel construction permits precision adjustment.

Shows mounting of MITI-MITE on mill arbor to line up milling vise.

Price \$7.50
Hand-
somely
wooden
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Posts and adaptors included for taking most small indicators.

OTHER "MITI-MITE" UNITS

No. 120—Combination Test Indicator Magnetic Base Holder and 4X double lens Magnifier...	\$12.00
No. 150—Duplex Magnetic Base Holder for all dial indicators up to 3" dia.....	\$15.50
No. 200—Magnetic Base Handi-Lite, complete with 25 and 40 watt bulbs.....	\$8.50
No. 300—Combination of No. 100 and 200.	

Send for Bulletins 602 and 603

Order from your mill supply dealer or send order with name of your mill supply dealer

ENCO MANUFACTURING COMPANY, Dept. 181
4524 W. Fullerton Ave., CHICAGO 39, ILL.

**HOLD IT!
I CAN HANDLE
THAT JOB!**



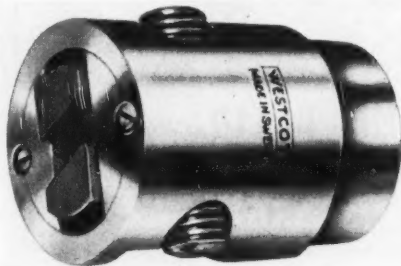
If a tap could talk—Oh, Boy! would your face be red! He'd ask, "Did you check the chart for material, lubricant, alignment, breakage, chipping, wavy threads, or tolerance?" This tap knows his mechanical data . . . he was made to rigid specifications, to stop your tapping troubles before they start. Wood and Spencer have engineered him to do a big job for industry. Just start him right and listen to him talk and hum a tune that'll make the whole shop "Tap-Happy."

The Right Tap At The Right Time

The Wood & Spencer Company
Cleveland 3, Ohio

Drill Chuck Is Easy to Operate

A Swedish-made two-jaw drill chuck of simple design and construction which is claimed to be easy to operate is now



Westcott Two-Jaw Chuck

being offered by Westcott Chuck Co., Oneida, N. Y. A feature of the chuck, which is furnished complete with a T-handled operating wrench, includes a reinforcing steel collar on the upper part of the chuck housing.

The chuck is available in three sizes as follows: No. 119-3 with capacity from 0 to 1/4 inch; No. 119-5 with capacity from 0 to 3/8 inch; and No. 119-6 with capacity from 0 to 1 inch. Morse taper arbors, as well as replacement parts, are available for each size of chuck.

Contact Wheel Is Claimed to Double Belt Life

Designated as the "61," a serrated rubber contact wheel that is said to virtually



Carborundum "61" Contact Wheel

double belt life in those operations where belt glazing is a problem factor has been announced by The Carborundum Co.,

STERLING DRILL GRINDER



CAPACITY:

$\frac{3}{8}$ " to $2\frac{1}{2}$ " drills.

5" x 9" adjustable table.

MOTOR: $\frac{1}{2}$ hp,
3450 rpm.

NET WT: 250 lbs.

CRATED: 320 lbs.

McDONOUGH MANUFACTURING CO.
EAU CLAIRE, WISCONSIN, U. S. A.

SAVE TIME - SAVE MONEY
Slash Production Costs

with AIRFLEX

Automatic Controlled
Pneumatic Riveter
ROTATING IMPACT

Strikes while hammer is spinning. Forms full tight head every time. No more spoiled pieces. Handle cold heads and unsupported rivets in brittle materials . . . such as glass, plastic, wood, hollow-ware. Unexcelled for heavy duty and multiple riveting on metals and alloys.

- Precision, straight - line pneumatic hammer blow and fluted, electric motor rotated peen.
- Interchangeable pneumatic hammer units.
- Adjustable to any length, any type rivet.
- Makes solid loose joints, any length rivet.

Write us about your riveting problems.



Bench
or
Pedestal
Model



LEMERT ENGINEERING CO.

INDEPENDENCE, MISSOURI, U. S. A.

Plymouth, Indiana



For Simplicity in OIL GROOVING!

The FISCHER No. 1 Oil Groover cuts a wide variety of grooves in bearings up to 8" in length and up to 5" inside diameter. A few simple settings permit you to cut continuous, relieved, straight or spiral grooves at any angle from parallel to perpendicular to the work. Grooves may also be cut in shafts, housings, etc.

This machine will slash grooving time and deliver continuous profitable production in your shop. It will pay to find out what it can do on your grooving jobs.

Write for Catalog.

Fischer Machine Co.

Established 1900

316 N. ELEVENTH ST. — PHILADELPHIA 7, PA.

Send parts
for free
grooving and
production
estimate

Niagara Falls, N. Y. Adaptable to a wide variety of abrasive belt-backstand idler applications in the metal-working field, the wheel is made so as to cause a controlled breakdown in the bond of the abrasive belt, with the result that glazing is reduced to such a degree that belt life is said to be doubled.

In addition to increase in belt life and cutting rates resulting from the relief angle, wide-spaced lands, and narrowness of lands of the wheel, the latter is also claimed to reduce the number of belt changes and provide for a more uniform finish since the rate of cut over the life of the belt is said to be more constant and

loading considerably diminished. Moreover, since the wheel assumes a heavy part of the work load, operator fatigue is reported to be effectively reduced.

Grinder and Lathe Dog Provides Cam Action

Claimed to increase production and efficiency by saving time and labor, particularly on semi-automatics and other equipment where there is little traverse feed, the Red-E "Cam Action" Grinder and Lathe Dog announced by Ready Tool Co., 540 Iranistan Ave., Bridgeport 5, Conn., is said to be easy to adjust and is available in sizes to accommodate di-

Announcing NEW CAM CLAMPS

These cam-action clamps were designed for applications where parts (such as castings, larger forgings, or stacked stampings) having variable thickness, are to be held. They are the only big cam clamps known that provide convenient means for locating the spindle assembly along the toggle bar. The spindle itself is easily adjusted for clamping height, and can be replaced by a special pressure pad to suit other clamping requirements.

MODEL CAV-1200

Recommended force at end of toggle bar: 1200 lbs. Recommended force 3 1/8" from front of base, 1900 lbs.

MODEL CAS-1200

This clamp has the additional advantage of permitting the toggle bar to be swiveled around the base to any position within 180°

MODEL CAS-2000

This clamp has the same features as Model CAS-1200, but for 2000 lbs. clamping force.

MODEL CAV-2000—similar to above but has fixed base.

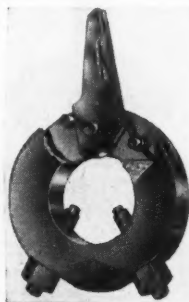
This entire series is also available without cam action (with fixed locking). Catalogued as Models V-1200, S-1200, V-2000, and S-2000. Complete catalog sent on request.

**KNU-VISE
PRODUCTS**

LAPEER MFG. CO.

3048 DAVISON ROAD • LAPEER, MICHIGAN

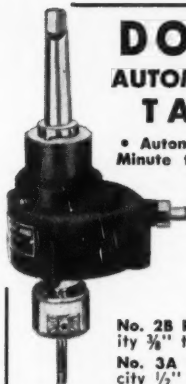
Western Division, 422 Magnolia St., Glendale, Calif.



Red-E "Cam Action"
Dog

ameters from 1/8 to 6 inches. A concealed spring holds the cam to the work; thus, the harder the drive, the tighter the grip. For grinders, the cam face is smoothly ground to prevent the marring of work. For lathes, the cam face is serrated to prevent slippage.

The dog is made entirely of steel, with specially hardened cam face and set screws. It is also available with brass cam and screws for grinding machines.



DORMAN AUTOMATIC REVERSE TAPPERS

- Automatic Torque Control, One Minute to Adjust, Prevents Tap Breakage, Operator Need Not Be Skilled.

- WIDE RANGE TAP CAPACITY.

No. 1 FRICTION DRIVE TAPPER—capacity No. 2-56 to $\frac{3}{8}$ " in Steel— $\frac{1}{2}$ " in Aluminum.

No. 2B POSITIVE TAPPER—capacity $\frac{3}{8}$ " to $\frac{1}{2}$ " in Steel.

No. 3A POSITIVE TAPPER—capacity $\frac{1}{2}$ " to $1\frac{1}{4}$ " in Steel— $\frac{1}{2}$ " to $\frac{3}{4}$ " Pipe Taps.

No. 4A TAPPER—capacity $\frac{3}{4}$ " to 2" in Steel including Pipe Taps.

- **PRODUCTION THREADERS** with Round Split . . . Button . . . Acorn Dies.

Priced from
\$48.00
Write for
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**IMMEDIATE
DELIVERY**

THRIFTMASTER PRODUCTS CORPORATION

Division of Thomson Industries, Inc.

1034 N. PLUM STREET, LANCASTER, PA.

(STANDARD UNIVERSAL) ADJUSTABLE AND SPECIAL FIXED CENTER DRUMHEADS

EASY READING



Rivett transparent packaging permits inspection of collet style and size without removal from carton. A time-saving feature eliminating stock room headaches.

Rivett Draw-In Collets are checked 25 times against master gauges! Work is guaranteed to run "dead true" at the collet mouth. Stocked in all standard styles.

Write for Bulletin 100

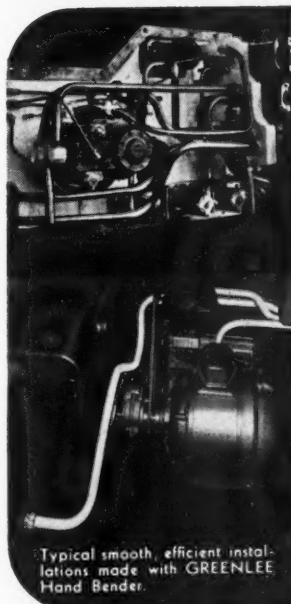
LATHE & GRINDER, Inc.

Brighton 35, Boston, Mass.

Dept. MMSA-8

For More Precision Work

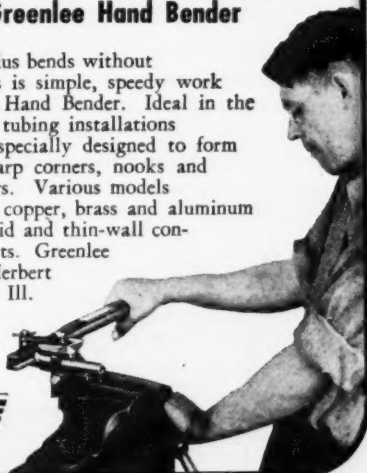
RELY ON RIVETT, The Master Craftsman's Master Tools



Typical smooth, efficient installations made with GREENLEE Hand Bender.

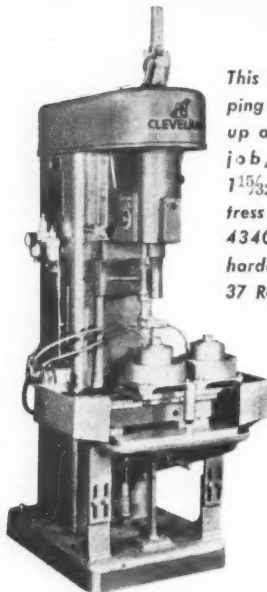
SMOOTH, accurate small-radius bends made quickly in pipe, tubing, conduit with Greenlee Hand Bender

Forming small-radius bends without flattening or kinks is simple, speedy work with a GREENLEE Hand Bender. Ideal in the shop for pipe and tubing installations on machines . . . especially designed to form neat bends for sharp corners, nooks and other close quarters. Various models and sizes for steel, copper, brass and aluminum tubing or pipe, rigid and thin-wall conduit. Write for facts. Greenlee Tool Co., 1988 Herbert Avenue, Rockford, Ill.



CLEVELAND TAPPERS

Cut Tapping Costs



This Cleveland Tapping Machine is set up on a munitions job, tapping a 1 $\frac{15}{32}$ " 16-pitch Buttress thread in SAE 4340 steel tubing hardened to 35 to 37 Rockwell.

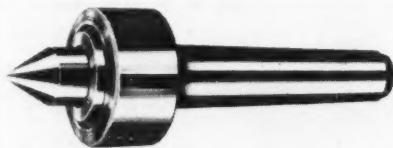
On Tapping, Threading, Drilling, Spot-facing, Reaming, and Chamfering operations, the chances are that CLEVELAND engineers can save you money and valuable working time by designing a CLEVELAND Tapping Machine which will not only combine several operations but also tap groups of holes at one stroke of the machine. Check with CLEVELAND first.

If you would like recommendations on a machine, submit prints, specifications, and sample parts. Write for your copy of the CLEVELAND Production Tapping Guide No. W-6.

THE CLEVELAND TAPPING MACHINE CO.
A Subsidiary of AUTOMATIC STEEL PRODUCTS, INC.
CANTON 6, OHIO

Center Features Free-Turning Point

Designed exclusively for light duty and precision small parts production jobs, a precision live center having a small free-

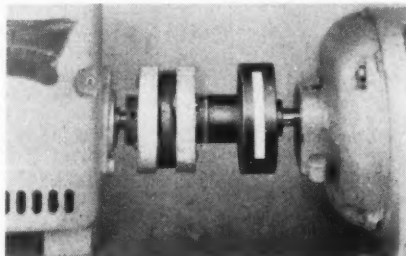


Regent Live Center

turning-point and constructed to provide unusual rigidity due to the stabilizing bearing located in the shank is now being marketed under the trade name of Regent by Royal Products, 89 Union St., Mineola, N. Y. According to the manufacturer, the center assures an accuracy of 0.0001 inch and eliminates chatter because of the unusually short overhang. The center is available with Nos. 1, 2, and 3 Morse taper shanks.

Clutch Coupling Connects Motor Shaft to Driven Shaft

Mercury Clutch Division, Automatic Steel Products, Inc., Canton 6, Ohio, has announced the Mercury Series "E" Clutch Coupling designed especially for installation on the shafts of integral horsepower electric motors up to 15 h.p. rating. The complete unit consists of a Mercury Series "E" Clutch with provision for mounting a standard flexible coupling between it and the driven load. Used in conjunction with a flexible coupling, the unit is said to provide a satis-



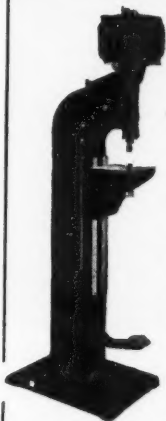
Mercury Series "E" Clutch Coupling

factory connection between the motor shaft and driven shaft without the necessity of maintaining exact alignment.

RIVETING?

for

FAST RIVETING WITHOUT NOISE



Put your production jobs on Linley Spinner Type Riveting Machines. No hammering! They spin rivet with twin rollers. In most cases the actual riveting time is one second per rivet, so that you can watch costs come down while noise is entirely eliminated! Direct Motor or Vee-Belt Driven. Bench or floor types.

Send samples of your work for free riveting, cost of equipment and true estimate on production.

LINLEY BROTHERS CO.

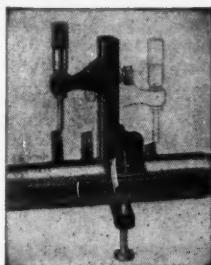
671 STATE ST. EXT. BRIDGEPORT 1, CONN.

SAVE TIME

With

Bartelt

Gages



• Use a Bartelt Pedestal Micrometer for setting boring tools and for many other shop operations requiring accurate positioning relative to a fixed base. Make settings in one step — eliminate cut-and-try methods. Model B, with reversible slide, shown. Write for literature describing all models.

BARTELT ENGINEERING CO.

1216 PARTRIDGE AVE.

BELOIT

WISCONSIN

HIGH SPEED PRODUCTION CONTINUOUS OIL GROOVING

WICACO CONTINUOUS OIL GROOVER cuts grooves of all descriptions, internal or external, continuous or intermittent.

Send us samples for grooving. We will return them cut to specifications, with a record of time and cost estimate. No obligation.

*Ask For Descriptive Booklet And See
How You Can Improve Your Production.*

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MACHINE CORPORATION

SINCE
1868

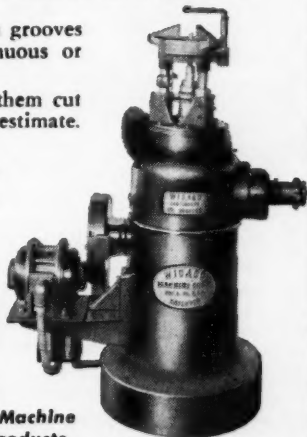
WAYNE JUNCTION, PHILA. 44, PA.

Manufacturers of

Precision Machinery and Machine Parts

Roller Bearing Twister Spindles—Spindle Oiling Machine

Precision Internal Grinder—Screw Machine Products.



Remote Control Arm for Backstand Installation

Behr-Manning Corp., Troy, N. Y., has developed a remote control arm for use on backstand installations in conjunction with the Delta idler unit. The advantages which are said to be provided by the use of this remote control arm are: (1) the operator has, at all times, complete control of belt tracking, particularly in cases where belts and wheels 1½ inches and narrower are used; (2) the elimination of down time in cases where belt guards have to be removed for belt tracking alignment; and (3) any

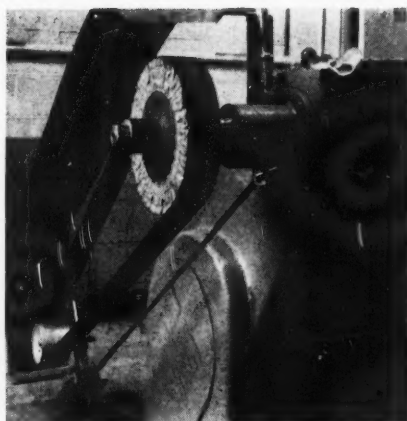


Illustration showing backstand installation of Behr-Manning Remote Control Arm

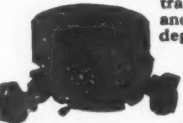
belt alignment desired can be quickly and easily obtained by the operator from the front operating position of the polishing lathe.

DUAL CROSS and ROTARY FEED

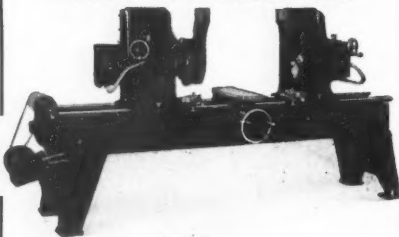
PALMGREN Rotary, Index MILLING TABLE

Has 8" table, 360° movement and 4" cross feed travel. Adjusting wheels and dials graduated in degrees and thousandths. Slotted for bolting to table. No. 82 without rotary feed \$42.75. Write for Circular No. 354.

CHICAGO TOOL and ENGINEERING CO.
8399 South Chicago Ave. Chicago 17, Ill.



"OLIVER" SEMI-AUTOMATIC Double End Miter Saw



Trims both ends of soft or thin metals smoothly, accurately, in half the time

Cuts both ends square or at any angle up to 45°. Automatic feed—7 to 21 strokes a minute. Capacity: thin metal up to 2" high, 4" wide; 7" to 72" long. Motor-units have V-belt drive—1600 r.p.m.

Write for Bulletin No. 195-V

OLIVER MACHINERY CO.
Grand Rapids 2, Mich.

Micrometer Adjustable Spacing Collar or Milling Machine Cutter Arbors

Made of a special alloy steel that is said to accommodate an arbor nut pressure up to and including 25 tons, a micrometer adjustable spacing collar announced by Dayton Rogers Mfg. Co., 2824 13th Ave., S., Minneapolis 7, Minn., is claimed to enable all milling machine cutters to be spaced within one-quarter of 0.001 inch by the visual graduating means engraved on the outer micrometer sleeve. Precision spacing of the collar, which is available in standard sizes from ⅝ to 2½ inches, is

F
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A
L

Vi-Speed
AIR-POWERED

FAST RUGGED

- HOLDING
- PRESSING
- PUNCHING
- SIMPLE DESIGN
- 8 MODELS
- Guaranteed

WRITE FOR CATALOG

VAN PRODUCTS CO.
3734-51 W. 12th Street
Erie, Penna.

ARTUS PLASTIC SHIM



AND
**FEELER
GAUGE
STOCK**

The **COLOR**
tells the
THICKNESS

Each thickness a distinctive, easy to identify color. Impervious to oil. Long lasting. 5"x20" sheets. Special sizes to order. Handy assortment, shim stock, 12 colors—12 thicknesses (.001-.030). Bound together. \$4.90.

Order today. *Immediate delivery.*

INDUSTRIAL PRODUCTS SUPPLIERS
201 S. Dean St., Dept. M, Englewood, N. J.



Co Clark

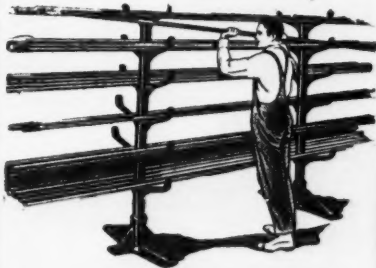
**ADJUSTABLE
HOLE
CUTTER**

Finished cuts the first time in boiler plate, pipe, plastics, hard fibre, stainless steel, Transite, etc. 7 models cut variable expansions from $\frac{3}{8}$ " to 5" holes, with thickness capacities from thin sheets to 1".

ROBERT H. CLARK COMPANY
Beverly Hills, California • M-8
Manufacturers of Precision Cutting Tools

SPEEDS UP STOCK-ROOM SERVICE

The **BROWN SECTIONAL RACK** saves the time previously lost in end-hauling each bar of stock its entire length from the old-style, closed-side Rack, the Brown Rack requiring but a few inches of side movement. Each length, width and thickness of stock is displayed in gold-fish visibility for instant selection. Workmen waiting for stock are served without waste of time.



Any time you require additional storage space, all you need do is add more units. If you want to relocate it at any time, you can do so quickly for it is unattached to the building.

It is a simple, durable article made of metal in five styles. It can't burn, warp, sag or twist; depreciation is practically nil. **SEND FOR BULLETIN No. 26-B DESCRIBING**

BROWN'S QUICK-SERVE RACKS

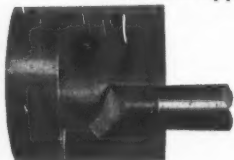
BROWN ENGINEERING CO.
120 N. THIRD ST. READING, PA.
RACKS • VISES • CLUTCHES • COUPLINGS

BORING TOOLS

WITH EXTRA ADVANTAGES!

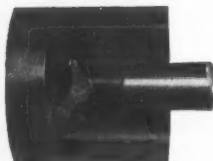
- REPLACEABLE TIPS AND SOLID TYPES
- IN FOUR FORMS
- FULL RANGE OF SIZES

To re-sharpen — grind top face only.
Made of Super-High-Speed steel or
carbide tipped.

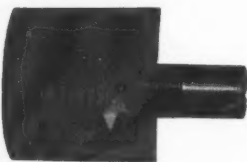


ALL STYLES

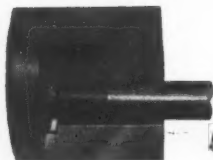
for general
boring



for bottoming
and facing



for internal
threading



for recessing



for boring holes
of 1/8" min.
diameter.

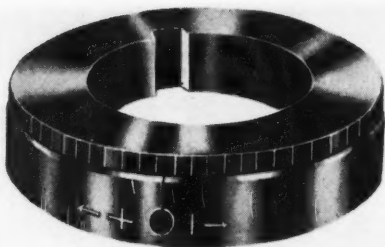


SOLID TYPES

Write for catalog

R. B. TOOL CO., Inc.

41 East Hartsdale Ave.
Hartsdale, New York



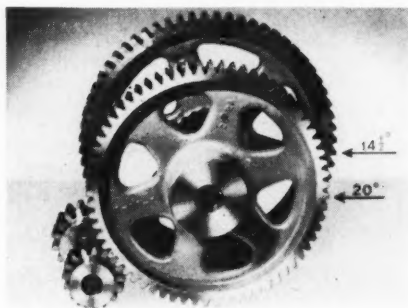
Dayton Rogers Micrometer Adjustable
Spacing Collar

effected by merely loosening the milling machine cutter arbor nut after the first trial cut is made. Adjustment is made by the directional plus or minus indicator, using a spanner wrench furnished as standard equipment. After the milling machine arbor nut is tightened, the collar is said to be so arranged that there is no slipping, and positive adjustment is assured throughout the production run.

Gears with 20-Degree Pressure Angles Save Space and Weight

Boston Gear Works, 68 Hayward St., Quincy 71, Mass., has announced standardized stock spur gears and steel miter gears with 20-degree pressure angles instead of the usual 14½ degrees pressure angles. The increased pressure angle is said to provide a wider tooth base, stronger tooth, longer contact surface, larger tooth bearing surface, and smoother rolling action. As shown in the

Illustration showing how 20-degree pressure angle gears of finer pitch can be used for equal work of 14½-degree gears with a resulting space saving of approximately 20 per cent



HOWALD CARBIDE MILLING CUTTERS



PATENTED
END MILL

- SQUARE BLADES Easily Replaced.
- Simple, Accurate Blade Adjustment.
- Lowest Blade Cost.
- Cutters from 1½" to 14" dia.



SHELL
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W. T. HOWALD
MACHINE WORKS

182 SIGOURNEY ST., BROOKLYN 31, N. Y.

MAUSER

"THE ORIGINAL"

MAUSER-PRECISION VERNIER CALIPER



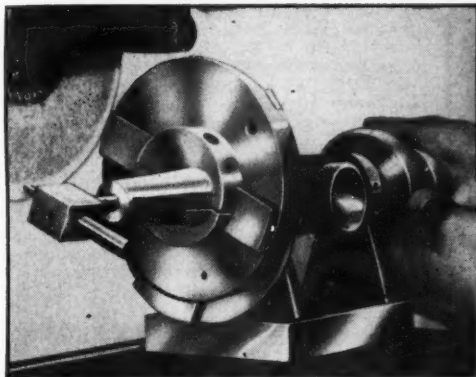
\$14.75
POSTPAID

3 GRADUATIONS
1/1000" - 1/128"
1/10 Millimeter in back

FOR MEASURING INSIDE
OUTSIDE AND DEPTH!!
THE MOST POPULAR MEASURING
TOOL IN AMERICA...
USED BY THOUSANDS
OF MECHANICS DAILY!

REQUEST ILLUSTRATED CATALOG
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COMPLETE LINE OF PRECISION INSTRUMENTS
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FAMOUS

SAMSON
Offset
BORING CHUCKS



PRECISION WHEEL DRESSING SIMPLIFIED!

THE LAST WORD IN . . .

- Angle tangent to radius wheel dressing
- Simplicity of setting
- Shortens dressing time
- Dresses grinding wheel at point of contact
- Rugged for long life

WRITE FOR COMPLETE DETAILS

LAST WORD SALES CO. • 18500 Mt. Elliott • Detroit 34, Mich.

accompanying illustration, 20 - degree gears of finer pitch may be used for equal work of 14½-degree gears, with a resulting space saving of approximately 20 per cent, it is stated. Gear weight is claimed to be similarly reduced, the average increase of horsepower per pound of gear weight being approximately 20 per cent for the 20-degree angle gears.

Clean-Oiler Prolongs Die Life

Product of The Medelton Co., Inc., 628 Westchester Ave., Bronx 55, N. Y., the Medelton Clean-Oiler illustrated herewith

MELCO CENTER POINT LUBRICANTS...

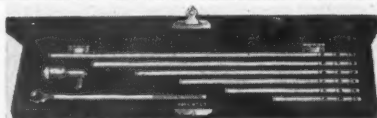
ideal for wherever extreme pressure or frictional heat prevails . . . on lathe, milling or grinding centers, steady rests and journals . . . tapping, broaching and extruding. Also excellent additive for cutting, broaching, tapping or drawing oils.

Sold in tubes, quarts, gallons or drums in oil or grease form.

Send for Free Sample

C. B. TEETER

4470 Oakenwald Ave., Chicago 15, Ill.



INTERNATIONAL INSIDE MICROMETERS

Handy — Accurate — Dependable. Immediate delivery. 2 sets are available. 1½-12", \$16.00. 1½-6", \$12.50. Prices include case and handle.

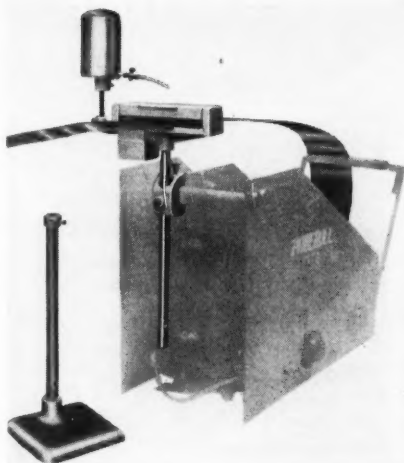
BRAND TOOL CO.

907 S. VICTORY BLVD. • BURBANK, CALIF.

AIRLOX PNEUMATIC VISES

Five senior models. Many special-purpose construction. 50 to 200 times airline pressures. Write for data sheets • Wedge-&-lever action utilizes total cylinder drive. Pat'd. Exceptional rigidity particularly suited to work-holding on CARBIDE MILLING, and almost all milling operations.

production devices, inc.



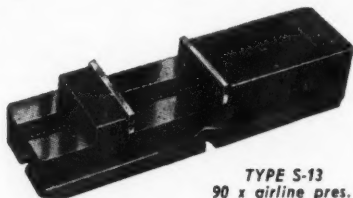
Medelton Clean-Oiler

is said to prolong die life by keeping stock free from grit and, at the same time, uniformly lubricating the stock, thus resulting in long runs between die sharpenings and high production per die. Excessive oil is caught in an overflow container and may be poured back into the tank.

Available in 10 and 12-inch sizes, the Clean-Oiler may be mounted either on the Medelton "Poweroll" stock cradle or on an independent floor stand. It is adjustable in height when mounted either way.

Safety Solvent

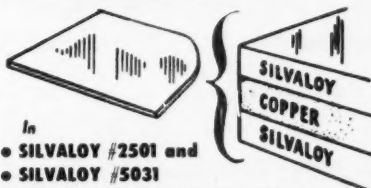
FO 128 is the name given to the latest solvent in the line of "FO" industrial and fleet automotive equipment maintenance chemicals marketed by Fine Organics, Inc., Aviation-Industrial Chemi-



TYPE S-13
90 x airline pres.
5¼ x 8¾ x 29
Max. jaw opening 12"

Whitehall, New York

PLYMETAL BRAZING SHIMS for CARBIDE TOOL TIPS



- In
 • SILVALOY #2501 and
 • SILVALOY #5031

Silvaloy No. 2501 and No. 5031 are clad materials furnished in three thicknesses:
 .020 thick consists of .010 copper center—
 clad both sides with .005 Silvaloy No. 2501
 .011 thick consists of .005 copper center—
 clad both sides with .003 Silvaloy No. 503
 .016 thick consists of .008 copper center—
 clad both sides with .004 Silvaloy No. 503

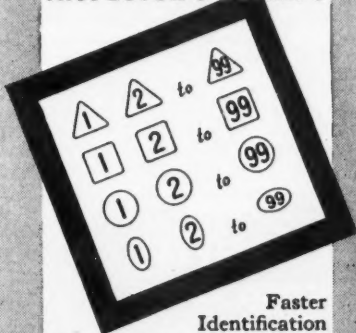
Each of the alloys are furnished with or without radius, square or rectangular, Pentagon shape 80 degree with radius, Pentagon shape 60 degree no radius, triangle, circles, etc. Available in all standard tool sizes.

Shims are also available in Silvaloy No. 503, No. 2501, Contantine and Copper.

STEEL SALES CORPORATION

3348 So. Pulaski Rd., Chicago 23, Illinois
 Blshop 7-7700

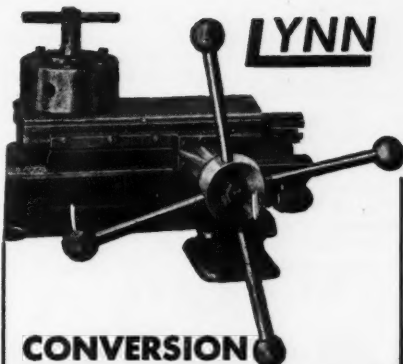
INSPECTOR'S STAMPS



Faster
 Identification
 of Inspectors or Operators.
 Different borders may be used
 for different shifts. Available
 in 4 sizes. Write for prices
 today.

NEW METHOD STEEL STAMPS, Inc.

145 JOS. CAMPAU DETROIT, U. S. A.



CONVERSION TURRETS & CUT OFF CROSS SLIDES

Fast Delivery

Especially adapted for the
 following lathes:

Logan	Craftsman
Atlas	Power Craft
South Bend	Clausing

Sheldon

Large Turrets to Order

Convert your engine lathes for turret work. Put your idle or unproductive lathes into full-capacity production — *At Once*. Lynn conversion turrets are easily and quickly mounted on your present lathes—all set and ready for full-capacity, close-tolerance production, just like new turret lathes, but at a small fraction of the cost.

Machine Tool Division



Write,
 Wire,
 Phone

MANUFACTURING CO., Inc.

1121 So. Seventh St., Minneapolis, Minn.

cals Division, 211 19th St., New York 3, N. Y. According to the manufacturer, FO 128 is offered for use as a safe alternative for carbon tetrachloride in applications where toxicity of solvent residues are factors, and may be used for the cleaning of both mechanical and electrical equipment parts with complete safety to materials and men.

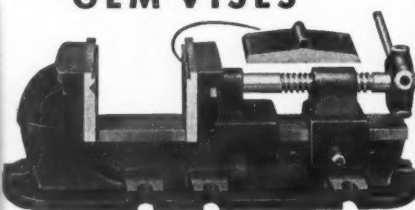
FO 128 is described as a clear, water-white solvent with drying time equal to Stoddard solvent. Its flash point (P-M closed cup) is 140 deg. F. Low toxicity,

minimum dermititus effects, high flash point, and zero residue on drying are additional factors claimed for FO 128, which is available in 53-gallon drums.

Ground Flat Stock Now Available in Wider Range of Sizes

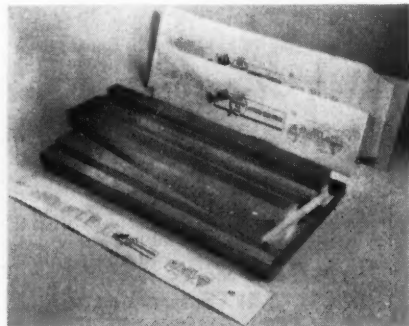
The DoAll Co., Des Plaines, Ill., has announced the addition of many new sizes to its line of ground flat stock, thus in-

GEM VISES



Made in a range of sizes and types, to handle most any kind of machining operation, where vises are applicable. Write for circular, etc.

J. E. MARTIN MACHINE WORKS, Springfield, Ohio



DoAll Ground Flat Stock

PREVENT ACCIDENTS

...use the **RIGHT TOOL** for the job!

DON'T BE A CAVE MAN



a BILLINGS® will do it better!

* VITALLOY® FORGED COMBINATION WRENCH

Ask your BILLINGS DISTRIBUTOR He'll tell you why!

THE BILLINGS & SPENCER CO. HARTFORD 1, CONN. U.S.A.

creasing to 203 the number of standard sizes available in this tool and die steel. Bars, for example, may be obtained in thicknesses ranging from 1/64 to 1 1/4 inches and in widths from 3/8 to 14 inches.

DoAll Ground Flat Stock is described as a fine grained electric furnace oil hardening tool steel with non-deforming qualities that assure accuracy in the manufacture of gages, punches, dies, templates, jigs, fixtures, stripper plates, machine parts, and tools. According to the manufacturer, the precision smooth finish of this steel makes it ready to use immediately on the layout bench.

KENNAMETAL CUTTING TOOLS

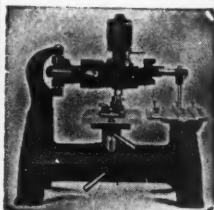
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ON STEEL,
OTHER METALS,
PLASTICS

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ANTI-FRICTION COMPOUND
In White Powdered Form



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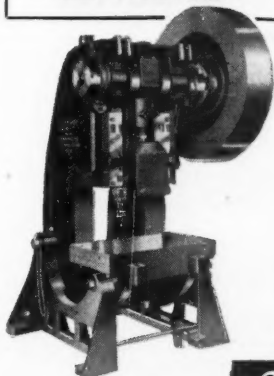
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Find out how Motor Mica can put an end to your lubricating problems. Try it with your cutting oils, in die-casting, deep-drawing, metal stamping, etc. Write on your business letterhead for free sample. No obligation.

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The Press-Rite No. 85 is available with either the popular 4-Point Key Clutch or an Air Friction type Clutch. And you have your choice of the flywheel or back-geared models. Get full details on the entire Press-Rite Line, TODAY!

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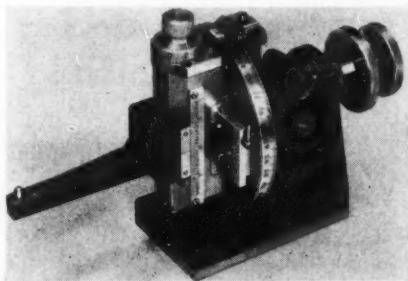
2355 UNIVERSITY AVENUE
ST. PAUL 4, MINNESOTA

Fixture Permits Dressing of Angle-Tangent-to-Radius Grinding Wheel Forms

The "Tangi-Matic" Dresser for the precision dressing of all angle-tangent-to-radius grinding wheel forms is now in production by Perfex Gage & Tool Co., 121 Avery St., Mt. Clemens, Mich. Designed to eliminate the need for gage blocks, height gages, micrometers, or other precision instruments in setting up, the dresser includes a built-in micrometer which is said to provide for direct reading, rapid adjustments, and accuracy down to tenths of an inch. Setting for required angles is effected by a vernier scale graduated in minutes. Two stop dogs control desired arc.

The Tangi-Matic is said to dress concave radii as small as 0.032 inch, full 180 degrees, using the small radius attachment furnished. To set for zero radius, the diamond is locked firmly to the height of the master setting gage, with the vernier and micrometer turned to zero. Settings to radii desired are made from this position, each revolution of the lead screw moving the diamond 0.050 inch. Designed to dress from the bottom of the grinding wheel, thus permitting the op-

erator to control the wheel accurately by using the grinder draw feed, the Tangi-Matic is furnished in a durable wooden



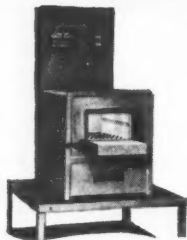
"Tangi-Matic" Dresser

case together with master setting gage, small radius attachment, and dustproof cover to protect the instrument while in use. All wearing parts of the dresser are made of steel, hardened, ground, and lapped. The micrometer lead screw of the Tangi-Matic is hardened and precision ground.

COOLEY HEAT TREATING FURNACES

ELECTRIC BOX TYPE • FLOOR AND BENCH MODELS
For Tools and Small Parts

SHOWN HERE



THE COOLEY BENCH MODEL RECIRCULATING AIR DRAW

Max. Temp.	Sizes	Price
1250°	10" x 6" x 14"	\$475

All prices are less controls. Any standard controls available for automatic temperature control.

1. IDEAL FOR

- aluminum and beryllium copper heat treating.
- closely controlled mild and high-speed steel tempering.

2. Stainless steel lined chamber.

3. Accommodates up to 50 lbs. of parts.

4. Holds temperature uniformity $\pm 5^{\circ}$ — 0° F.

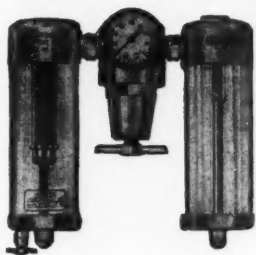
5. 4 kw. input at 230 v. assures rapid heating.

Brown and Wheeler Control Pyrometer carried in stock—available for all applications.
Free on request: ☐ COMPLETE CATALOG ☐ "SHOP NOTES ON HEAT TREATING"

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34 SO. SHELBY • INDIANAPOLIS, IND.

"M-B" AUTOMATIC
Air Line
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and LUBRICATOR ASSEMBLY



**"Sentinel
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FILTER element removes solids .00039 and larger. TRANSPARENT BOWL provides visibility. REGULATOR is capable of passing large volume with an unrestricted flow and minimum amount of pressure drop. Self-bleeding, compact, simple. Machined from bar aluminum. LUBRICATOR delivers desired volume of oil. Adjustable Venturi Valve permits efficient operation on broad range of volume and pressure. Bowl can be refilled without shutting off air supply. Any of these 3 devices can be used as separate units or in any combination.

**Also "M-B"
PNEUMATIC
GRINDERS**

**"Remember, Built-in Quality
Remains Long After First Cost
Disappears"**

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M-B PRODUCTS
46 VICTOR AVE.
DETROIT 36, MICHIGAN

August, 1951



**END MILLS
and HOLDERS
— by Reltool**

Precision processed of finest high speed tool steel, and scientifically heat treated for long cutting life . . . Reltool End Mills are famous for long cutting life. Available in single- and double-end types, in small and large diameters, with 2, 3, and 4 flutes, with straight or ball ends, in over 1000 stock sizes.



• RELTOOL END MILL HOLDERS are made in both Tang and Draw Bar Style, and with Morse or Brown & Sharpe Taper. Sizes over 3/4" have Dual Set Screw. For complete list of sizes and prices see Reltool Catalog No. 50 and latest Discount Sheet.

Reltool CORPORATION
RELIABLE METAL CUTTING TOOLS

4540 W. BURNHAM ST. • MILWAUKEE 46, WIS.

MODERN MACHINE SHOP 335

**Accurate Hole Transfer Made Easy With
NIELSEN TRANSFER SCREWS**

Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 8 sizes, from $\frac{1}{8}$ " to $\frac{3}{4}$ " U.S.S. Inexpensive — Last for years.



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**AUTOMATIC, ADJUSTABLE
HYDRAULIC
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TURNER**

More pieces per
dress! Eliminates
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AVAILABLE FOR
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less, Landis Ca-
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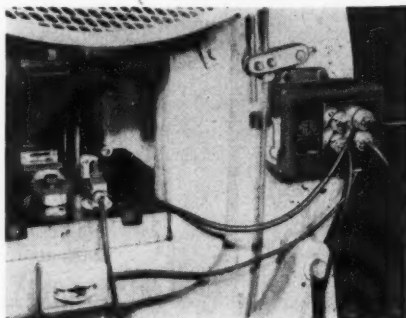
Fast re-setting & re-lapping service. Special
attention to Defense Contract problems.



Cleveland Industrial Tool Corp.
1080 East 222nd St., • Cleveland 17, Ohio

**Device Protects Machines, Tools
and Dies**

Known as the U. S. Multi-Stop, a device which is designed to protect dies, tools, presses, and other machines from break-



U. S. Multi-Stop installed on a punch press

age has been introduced by U. S. Tool Co., Inc., Ampere (East Orange), N. J. The device can be arranged to stop the machine automatically (1) at the end of a coil or strip; (2) if the stock buckles between the feed unit and die; (3) if the thickness of the stock varies beyond specified limits; (4) if the width of the stock varies beyond specified limits; and (5) if a short feed occurs. These various functions are effected through the use of switches connected to plugs in the control box of the device. Thus, as the end of the stock passes through the feeder or a buckle occurs, and so on, the switch de-energizes a solenoid which disengages the clutch on the machine and the ram is stopped at the top of its stroke.

Although the accompanying illustration shows the U. S. Multi-Stop installed on a conventional punch press, the device

for speedy drilling

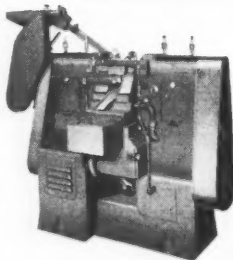
OF COTTER PIN HOLES IN SCREWS, BOLTS, ETC.

The KENT Duplex DRILLER

Two drills move toward the center. One drill then withdraws and the other completes the hole. Parts can be drilled and countersunk at the same operation. Semi-automatic or full automatic feed. Write for illustrated descriptive literature.

The KENT MACHINE CO., Cuyahoga Falls, O.

Drillers • Threaders • Slotters • Countersinkers • Bar Pointers



Send for
FREE SAMPLE!



TRY THIS DIXON
LATHE CENTER LUBE

See for yourself
... at no cost
... how superior it is!

*Stops wear, scorching,
burning, breakdown*

• Do you use white lead or ordinary grease to lubricate lathe dead centers? If so, do this . . . write for a trial tube of Dixon Lathe Center Graphite Lubricant.

We'll send you a handy tube of Dixon Lube **ABSOLUTELY FREE**. Once you try it, we are certain you'll swear by it forever!

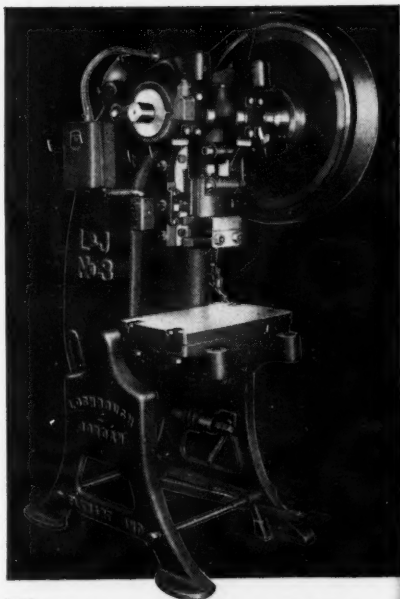
Remember, this is no ordinary lubricant. It's special throughout . . . combines Dixon *Natural Graphite* and special lubricating compounds to provide *great film strength*. That's why it withstands terrific pressure and friction!

ALL YOU NEED DO is write to us (letter or post card), requesting free sample. Just give your name and position, and your company's name and address. Joseph Dixon Crucible Company, Jersey City 3, N. J.

DIXON
Graphite
LATHE CENTER LUBE
Sold through Distributors



August, 1951



L&J PRESSES

for Fast, Low-Cost Production

It's the speed, accuracy and dependability of L & J Presses that enable them to produce low-cost stampings and drawings. You will find that this efficiency can be profitably utilized in the manufacture of a wide variety of parts.

Their rugged construction gives you longer die life . . . better work . . . less maintenance. It will pay you to find out how these O.B.I. presses can give you better production. Made in 12 models—back geared and plain flywheel types—6 to 80 ton capacities.

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CAMS

A complete cam cutting service for both large and small cams is offered by our **ROWBOTTOM** and **DALY** cam milling facilities.

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For All Lathes—Old or New—
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Supreme**

**LAY-OUT AND
IDENTIFICATION DYE**

13 COLORS

For Tool, Die, Pattern or Template layout on metal . . . Quick identification of bar stock, sheet, strips or parts . . . Shows up in sharp relief—dries instantly . . . Write for sample and circular on company letterhead.

**MICHIGAN CHROME &
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6340 E. Jefferson Ave. • Detroit 7, Mich.

can be readily applied to many other types of machines for safeguarding operation.

Self-Aligning Strap Clamp

Made from selected steel and heat treated after forging for added strength and durability, the Mathison Drop-Forged



Mathison Drop-Forged Self-Aligning Strap Clamp

Self-Aligning Strap Clamp now being marketed by Everett Sales Co., 4116 Fourth Ave., Brooklyn 32, N. Y., is designed to hold workpieces firmly on machine tables, faceplates of lathes, milling machines, planers, punch presses, and fixtures. The strap is provided with adjustable and self-aligning elements to allow for use in connection with workpieces of various sizes and shapes. A ball and socket arrangement makes the gripping members free floating and universal and enables the clamp to hold workpieces having inclined surfaces in any direction. A ball washer on the bolt of the clamp enables the bolt to remain in a vertical position.

The clamp is available in 5 and 8-inch strap lengths with bolt sizes of $\frac{3}{4}$ and $\frac{1}{2}$ inch respectively. The 5-inch size clamp is designed to hold workpieces up to 2 inches without blocking or shims. With the 8-inch clamp, no blocking or shims are required for work up to 3 inches.

**GET MORE PRODUCTION OUT OF YOUR
PRESENT POWER PRESS EQUIPMENT**

with the
V&O
FEED-O-MATIC
**POWER
PRESS
FEEDER**

THE V&O PRESS COMPANY
DIVISION OF EMHART MANUFACTURING COMPANY
Builders of Precision
POWER PRESSES AND FEEDS
Since 1889 HUDSON, N.Y.

Installed on Any Make Press
for Secondary Die Operations

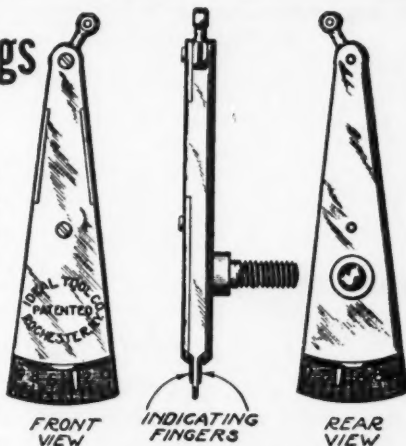
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DIAL Indicator Readings

From Front or Rear

- Accurate readings from the front or rear of an IDEAL INDICATOR is especially helpful when locating holes or where the indicator is fastened to a revolving spindle.

- IDEAL INDICATORS have been serving industry for 40 years with complete satisfaction. Prices shown include holder. Why pay more for superior service?



Price . . . \$6.00

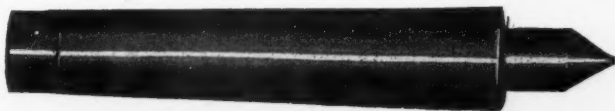
Write for complete details.

IDEAL TOOL CO., 407 RIVER ST., ROCHESTER 12, N. Y.

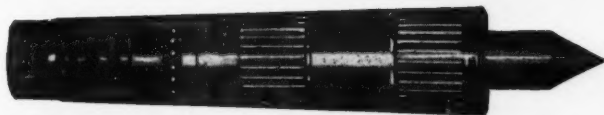
CONCENTRIC
SPRING LOADED

LIVE CENTER

THE ORIGINAL
CONCENTRIC
LIVE CENTER



FASTER
SPEEDS



AUTOMATIC
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ADJUSTMENT

Patented

Operates 4 - 5 times faster than ordinary live centers.
Less overhang... means more rigidity, more working range.
Spring loaded spindle gives automatic tail stock adjustment.

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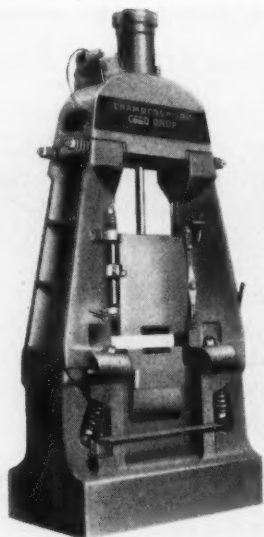
CONCENTRIC TOOL CORP.

2970 Huntington Drive
San Marino, California

Gravity Drop Hammer Is Said to Be Especially Suited to Cutlery Production

Chambersburg Engineering Co., Chambersburg, Pa., has announced the Model "C" Ceco-Drop, a piston-lift gravity drop hammer designed for the production of work requiring short snappy strokes, including cutlery, hollowware, jewelry, silverware, and so on. Since work of this nature often makes it necessary to wipe or polish the top die after a certain number of strokes, the machine includes a

safety rest attached to the left-hand frame which can be easily swung into place under the ram when elevated. The



Chambersburg Model "C" Ceco-Drop

NEW

Pen-Blu

LAYOUT DYE



for
**LAYOUT
WORK
OF ALL
TYPES...
ON ALL
METALS**

Easily and quickly applied • Dries instantly
• Sticks to any dry, clean surface • Not affected by oil, water, coolants, etc. • Easy to remove • Will not blur, smudge, chip or peel
• Long lasting • Low cost • Economical.

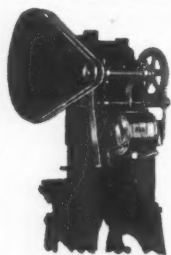
— write for free descriptive bulletin.



**PENINSULAR CHEMICAL
PRODUCTS COMPANY**
6795 EAST NINE MILE ROAD
VAN DYKE • MICHIGAN

ram is lifted by a piston operating in a cylinder and falls by gravity. The stroke is controlled by quick positioning dogs mounted on a pivoted rocker which, in turn, is connected to the operating valve of the machine.

The Chambersburg Model C Ceco-Drop has a 20 to 1 anvil; that is, the anvil is 20 times the weight of the ram. It may also be made with a 15 to 1 anvil where specified.



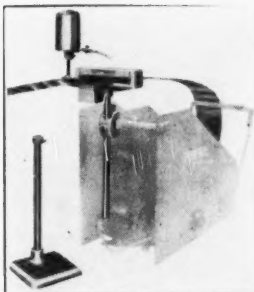
Put the "PUNCH" in Punch Presses with a MODERN Motor Drive

No need to use slow speed or geared motors and small pulleys to slow down your presses.

Utilize standard 1750 RPM motors.

"V" Belt Drive absorbs shock. Operate smoothly, silently, efficiently, economically. Write to Dept. MS for complete details.

MODERN MOTOR DRIVES DIV. of The Nichols Engr. Co.
Dept. MS, 3816 W. GRAND AVE. CHICAGO 51, ILL.



Medelton

CLEAN—OILER

PROLONGS PIE LIFE • SAVES MAN HOURS.

Stock is kept free from grit and is uniformly lubricated, resulting in longer runs between sharpening and higher production per day. Mounts on "Powerall" Coil Cradle or floor stand. Operators save time ordinarily spent in hand lubrication.

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THE MEDELTON CO., INC., 628 Westchester Ave., Bronx 55, N. Y.

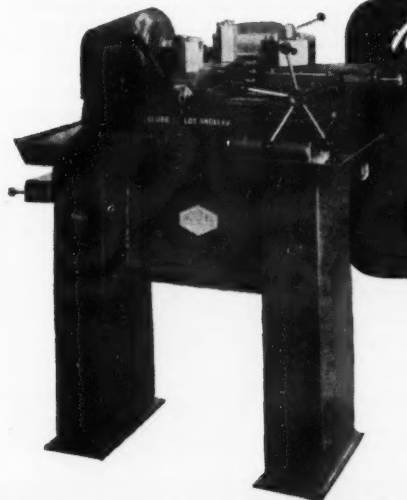
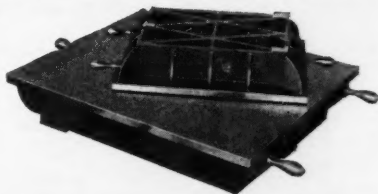
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Surface Plates, Angles, Parallels, and Straight Edges are all backed by over twenty years of practical experience. You pay no more for this added assurance of accuracy and durability.

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Engineers and Machinists Since 1907

126 E. Pittsburgh Ave., Milwaukee 4, Wisc.



*Makes SHORT WORK
of SMALL PARTS!*

LOW COST, PRECISION

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HAND SCREW MACHINE

10" SWING, 1" COLLET CAPACITY

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Boring Bars & Holders, Milling Attachments.

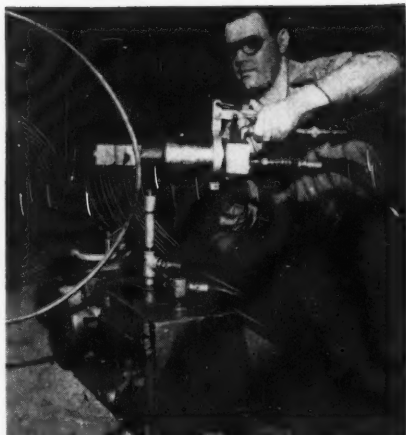
GLOBE PRODUCTS-HEAT SEAL CORPORATION

3384 ROBERTSON BLVD., LOS ANGELES 34, CALIFORNIA

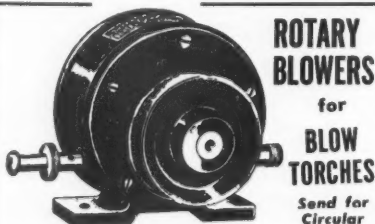
Hydraulic Rod and Cable Cutter Provides 60,000-Lb. Thrust

Manco Mfg. Co., Bradley, Ill., has announced the "Guillotine" 20E Hydraulic Cutter, a portable cutting tool for the larger diameters of rod, bar shapes, chain, bolts, wire rope, cable, and similar material. According to the manufacturer, the cutter is fast acting (only $2\frac{1}{2}$ seconds being required for the cutting cycle) and is light in weight (the cutting head unit weighing 38 lb.). Present models are said to cut rods and bars up to $1\frac{1}{8}$ inches in diameter, wire rope up to $1\frac{1}{4}$ inches in diameter, and cable up to $3\frac{1}{2}$ inches in diameter.

The cutting head unit is connected by 25 feet of flexible hose to a high speed hydraulic pumping unit which is semi-portable and can be dolly-mounted for complete mobility. The pumping unit is



"Guillotine" 20E Hydraulic Cutter in use



BUFFALO DENTAL MFG. COMPANY
Buffalo 3, N. Y.

available with either of two power units—a 2 h.p. electric motor or a portable gasoline engine. The latter is generally for use in the field.

The operation of the Guillotine is described as simple. With the pump "on", the operator closes a remote hand valve mounted on the cutting head, thus causing the cutter blade to make the cut with a 60,000-lb. thrust. Release of the hand valve provides for automatic blade retraction.

The "MIGHTY MIDGET" Line

ORDER DIRECT on our 10 day money back guarantee.

RADIUS DRESSER \$34.00
Diamond \$7.00



HARDENED shaft—Bearing adjustable for wear.
Diamond always perfectly centered.
Easily set adjustable 180° stops.
10" Wheel size for DoALL and NORTON Grinders—\$39.00. Diamond \$7.00.
SPECIAL 14" Wheel Size \$89.00.

SPERMAN METAL SPECIALTIES

Special Size
Angle and Radius
Dressers Made
to Order.
Send for
Quotation.

ANGLE DRESSER \$39.00
Diamond \$7.00



First low cost
high precision
Angle Dresser on the Market. Can be set very accurately with a Protractor. Works underneath the wheel. Large bearing surfaces.

• 2197 E. 21st St. • BROOKLYN 29, N. Y.

Please Send D.O. No. with Order, when possible.

D & M AUTOMATIC PRESS GUARD



- No Springs
-
- No Cables
-
- Fits Any Machine
-
- Low Initial Cost
-
- Low Maintenance
-

• This punch press guard meets the most exacting standards of safety engineers and safety laws. Permits operator to feed the press without hindrance.

Write for complete information.
Immediate Delivery

D & M GUARD Co.

820 Revere Ave.

N. Tonawanda, N. Y.

CLIPPER

PRECISION DIAMOND TOOLS

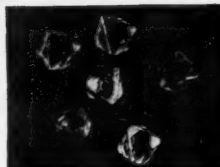
Industrial Diamonds

Thread Grinders
Turning Tools
Engraving Tools
Dressing Tools
Diamond Powder



CT5
Cluster
Tool

Every CLIPPER tool is guaranteed. Send blueprints. Let us quote on your requirements.



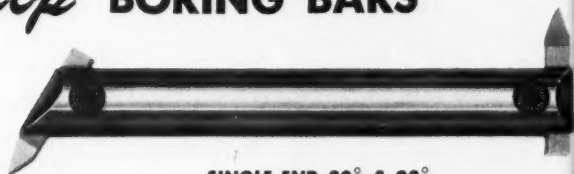
Quick Delivery on Diamond Wheels
Representatives in Principal Cities

CLIPPER DIAMOND TOOL CO., INC.

21-C W. 46 ST. N.Y. 19



Shuregrip BORING BARS



DOUBLE END 30° & 90°

Number	1-A	2-A	3-A	4-A	5-A	6-A	7-A
Bar. Dia. In	3/8	1/2	3/4	1	1 1/4	1 1/2	1 3/4
Length In	7	8	9	11	13	18	23
Cutter In	1/8 Rd.	1/8 Rd.	1/8 Sq.	1/4 Sq.	1/4 Sq.	3/8 Sq.	1/2 Sq.
Price Each	1.95	2.10	2.95	3.25	4.55	10.75	20.80

Adjustable Boring Bar holders available take bars from 3/8" up to 1 1/2" diameter. T-Blocks made to fit any lathe. Price list on request.

**WRITE FOR PRICE
ON LARGER BARS**

SINGLE END 30° & 90°

Number	1-B	2-B	3-B	4-B	5-B	6-B
Bar. Dia. In	3/8	1/2	3/4	1	1 1/4	1 1/2
Length In	3	4	5	7	8	10
Cutter In	1/8 Rd.	1/8 Rd.	1/8 Sq.	1/4 Sq.	1/4 Sq.	1/2 Sq.
Price Each	1.25	1.35	2.20	2.50	2.60	2.80

BREAK OFF ON SCORE, AS REQUIRED

1-6" Length—1/8 Dia. H.S.S. Tool Bit Stock—Hardened—each **95¢**
 1-6" Length—1/8 Dia. H.S.S. Tool Bit Stock—Hardened—each **\$1.05**
 Round Tool Bits Furnished in 1-A, 2-A, 1-B and 2-B—All Others Square. 1 Hexagon Wrench Furnished with Each Bar.
 Price of Square H.S.S. Cutter Bits. 1/8x1 1/4 .20 1/8x1 1/2 .30 1/8x1 3/4 .40 1/8x1 7/8 .65

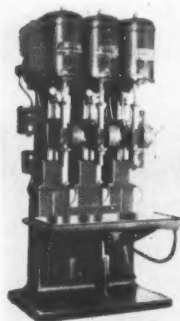
J. E. FREYMAN & SONS, INC.

3627 KESWICK RD.

BALTIMORE 11, MD.

Drilling and Tapping Machine Has Infinite Speed

Designated as the Model 2F, a drilling and tapping machine with infinitely



Edlund Model 2F
Drilling and Tapping
Machine

variable speed drive that allows the operator to select the correct speed — within a broad range — for maximum tool life and production has been introduced by Edlund Machinery Co., Cortland 5, N. Y. Speed changes are effected instantly by a handle control mechanism, with an indicating dial showing the speed selected. Spindle speed ranges from 200 to 2,700 r.p.m. are standard; additional speeds from 50

to 675 r.p.m. are obtained with back gears.

The machine, which has a capacity of $\frac{1}{4}$ inch in steel (1 inch with back gears) and $\frac{3}{8}$ inch in cast iron ($1\frac{1}{4}$ inches with

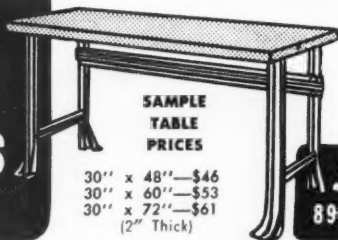
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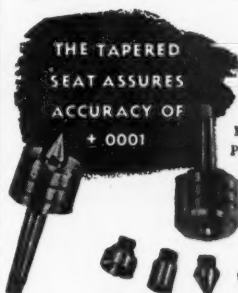
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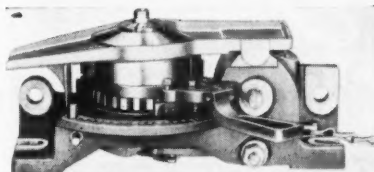
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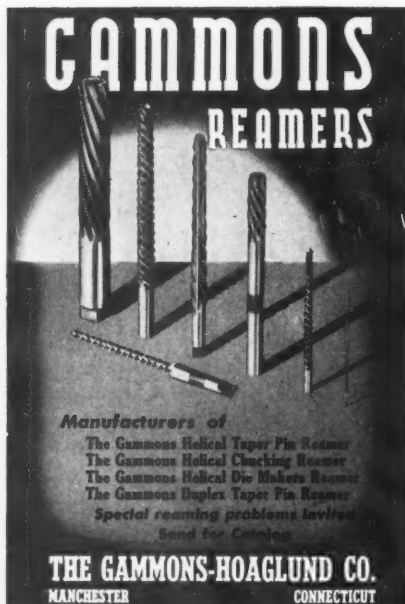
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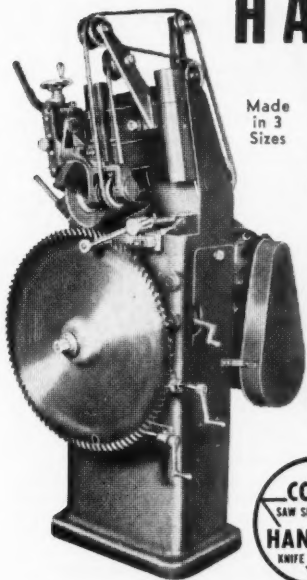
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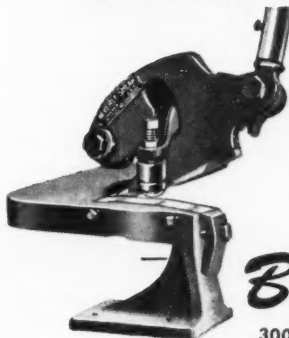
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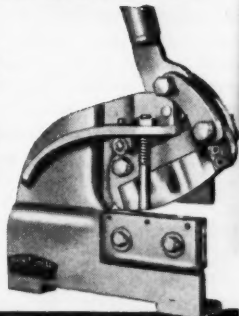
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New Shop Literature

"Boosters and Their Practical Application" is the title of a four-page reprint available from Miller Motor Co., Dept. M, 4027 N. Kedzie Ave., Chicago 18, Ill., which describes practical advantages and applications of "Dual Pressure" boosters developed from standard air and hydraulic cylinder components. A circuit drawing, illustrations, and a detailed description of typical practical applications are presented. Single pressure boosters for small volume requirements and high speeds are also discussed. In addition, methods of returning booster-driven hydraulic cylinder, simplicity of booster maintenance, and other important points are covered.

"50 Years of Fine Steelmaking" is the title of a 36-page booklet issued by Crucible Steel Company of America, Dept. MS, Chrysler Bldg., New York 17, N. Y., highlighting its operation of supplying special purpose steels to industry over the past half century. Beginning with a discussion of the founding and early years of Crucible, the book discusses the new methods of steelmaking developed by the company, its expansion and integration. The builders of Crucible are mentioned on a separate page, followed by a discussion of the company's record in two world wars. The booklet next describes Crucible's plant improvement program, after which information is presented on the firm's Midland Works where iron, alloy steels, automotive steels, agricultural steels, stainless steels, and bearing steels are produced; Park Works, where bar specialties, machinery steels, drill steels, and stainless steel and alloy sheets are made; Sanderson-Halcomb Works, devoted to the production of tool steels, high alloys, and super alloys; Spaulding Works, engaged in the production of cold rolled specialties, magnets, and cast alloys; Spring Works, where railroad springs and industrial springs are made; and Trent Tube Company, manufacturer of Trentweld tubing. Rem-Cru Titanium, Incorporated, jointly formed by Crucible Steel Company of America and Remington Arms Company, Incorporated, to develop and produce titanium metal and titanium alloy products, is likewise mentioned. Other data in the booklet are devoted to research and development, customer services, employees, and future planning.

Gear Hobbing Machine. A four-page descriptive folder on a semi-automatic vertical gear hobbing machine developed by S. Lambert S. A., Soleure, Switzerland, for making all types of small instrument gears is now available from Carl Hirschmann Co., 30 Park Ave., Manhattan, New York.

Cemented Carbide Products. Kennametal Inc., Latrobe, Pa., has published a 76-page catalog (No. 51) presenting specifications and prices of a complete line of cemented carbide products, including brazed-on tools, boring tools, Kennamatic tools, planer tools, Kennamills, tool blanks, Kendex tools and inserts, clamped-on tools, roll tools, Kennadrills, deburring files, wear parts, and so on. The tools are segregated in sections of the catalog and graphically indexed, for ready reference, on the inside front cover. Helpful data on Kennametal and its diversified applications are also presented, including information on recommended grades for different materials and types of cuts; suggestions for cutting speeds on steel of different hardnesses; machining hints for steel, cast iron, and non-ferrous materials; tool wear analysis; complete description of Kennametal compositions, including mechanical and

physical properties; data on how to design for best results from Kennametal; description and characteristics of the new heat-resistant material, Kentanium; and illustrations of typical wear-resistant applications.

Vertical Hydraulic Presses of 6 and 12-ton capacities are covered in a four-page circular (No. 206) issued by American Broach & Machine Co., Ann Arbor, Mich. The circular includes information on all standard features of the presses; illustrates typical uses for the presses, such as surface broaching, push-down and internal broaching, and assembly operations; and lists complete specifications of the machines and special equipment available for same.

Punches and Dies. A 16-page pocket-size circular (No. 533) issued by Pratt & Whitney, Division Niles-Bement-Pond Co., Dept. MMS, West Hartford 1, Conn., contains illustrated, descriptive, and tabular information, including sizes and prices, on standard punches, standard punch dies, standard punch couplings, steel sockets, drifts or center keys, steel sleeves, standard steel taper pins, and ratchet drills.

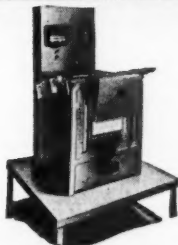
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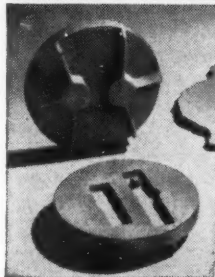
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Numbers shown are page numbers in this issue

— A —

Abrasive Cloth, Paper, Discs, Belts, Stones, Etc., 7, 26, 32, 81, 186, 187, 211, 219, 251, 271, 299
Absorbents, Oil and Grease, 174
Actuators, 96
Adapters, 243
Air-Operated Equipment (Look for specific item)
Alloys, 133
Amplifiers, Electronic, 28
Angles, 264, 341

— B —

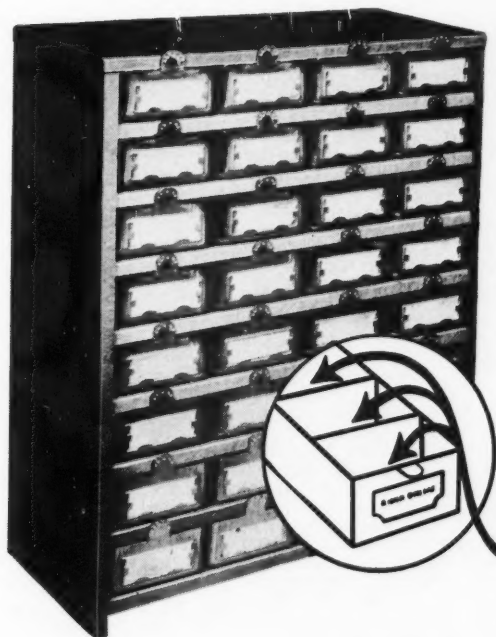
Balancing Machines, 152 A, B, C, D
Balancing Ways, 291
Bar Feeds, 45, 210
Bar Stock, 232
Bases, Motor, 318
Battery Chargers, 315
Bearings, Ball, 245
Bearings, Bronze, 245
Bearings, Oilless, 181
Bearings, Sleeve, 181
Bearings, Thrust, 299
Bolting, V, 270
Benches, Work, 344, 357
Bending Devices, 323
Bending Machines, 18, 33, 105, 147, 150, 212
Bins, 231, 305
Bits, Power, 243
Blades, Centerless Grinder, 232
Blades, Cutting-Off, 118
Blades, Milling Cutter, 54
Blades, Scraper, 291
Blocks, Magnetic, 301
Blocks, Step, 216, 301, 308
Blowers, 342
Bolts, 239, 259, 301
Books, 133
Boring and Milling Machines, Vertical, 11
Boring Bars, 291, 341, 343
Boring, Drilling and Milling Machines, Horizontal, 43, 188
Boring, Drilling and Tapping Machines, Multiple, 22, 38
Boring Heads, 114, 238, 263, 285
Boring Machines, Second Cover, 43, 260
Boring Mills, Horizontal, 76
Boring Mills, Universal, 43
Boxes, Shop, 305
Brackets, 351
Brakes, Air, 96, 166, 167
Brakes, Press and Bending, First Cover, 91, 105, 244

Broaches, 77, 78, 79
Broaching Machines, 8, 9, 36
Brushes, Wire Wheel, 115
Buffers, Portable Electric, 372
Buffing Machines, 267, 341, 371
Bushings, Drill Jig, 214, 232, 266, 298, 307, 312, 346
Bushings, Gage, 120
Bushings, Hinged-Shoe, 153
Bushings, Sleeve, 232

— C —

Cabinets, 353
Calipers, 113, 319, 329
Cam Automatics, 64
Cams, 305, 314, 338
Carbides, 133, 232
Cartridges, Gage Head, 28
Cartridges, Tap, 110
Castings, Machine, 351
Centering Machines, Automatic, 147
Centers, Bench, 152
Centers, Lathe, Planer, Miller, Etc., 226, 258, 281, 301, 305, 313, 339, 345
Chains, 245
Checking Rolls, 291
Chucking and Indexing Fixtures, 93, 345
Chucks, Boring, 329
Chucks, Collet, 317
Chucks, Drill, 63, 218, 315
Chucks, Internal, 144
Chucks, Lathe, 63, 213, 218, 315
Chucks, Magnetic, 203, 213, 235
Chucks, Tap, 243
Chucks, Universal, 213
Chucks, Wrenchless, 315
Clamps, 281, 288, 297, 322, 344
Cleaners, Vacuum, 290
Clutches, 45, 327
Coil Handling Equipment, 189, 202, 274, 311
Collars, 345
Collet Closers, 269
Collets, 15, 207, 286, 317, 323
Compressors, Air and Gas, 47
Controlling Devices, 96, 163
Conveyors, 192
Coolant Separators, 151
Coolant Units and Systems, 209, 210
Counterbores, 99, 175, 215
Countersinking Machines, 336
Countersinks, 175, 319
Couplings, 327
Couplings, Flexible, 245
Cranks, 301
Cross Slides, 269, 331, 341
Cut-Off Machines, 147, 221, 367
Cut-Off Wheels, 281

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Cutter Sharpening Machines. 8, 9, 296

Cutters, Gear. 77, 296

Cutters, Hole. 327

Cutters, Milling. 54, 68, 69, 77, 99, 177, 191, 215, 218, 329, 332

Cylinders, Hydraulic and Pneumatic. 42, 46, 53, 56, 57, 166, 167, 351

— D —

Demagnetizers. 213

Diamond Compounds. 343

Diamonds and Diamond Tools. 336, 343

Die Cushions, Pneumatic, First Cover

Die Filers. 256

Die Heads. 2, 185

Die Making Machines. 35, 121, 125, 129

Dies. 4, 15, 172, 185, 205, 215, 218, 232, 279

Die Sets. 4, 37, 143, 259

Dividing Heads. 170, 213, 304

Dressing Fixtures, Grinding Wheel. 297, 329, 342

Drill Heads. 111, 149, 158, 165

Drill Stands. 41

Drilling and Tapping Machines, Automatic. 93

Drilling and Tapping Units. 80, 311

Drilling Attachments. 126, 216

Drilling Machines, Bench. 20, 21, 33, 80, 142, 165, 269, 287

Drilling Machines, Duplex. 336

Drilling Machines, Horizontal. 65, 260

Drilling Machines, Multiple Spindle. 20, 21, 33, 65, 260, 287, 302, Third Cover

Drilling Machines, Radial. 14, 73, 76, 95, 165

Drilling Machines, Vertical. 65, 95, Third Cover

Drills, Center, Core, Twist, Square, Etc.. 66, 67, 99, 175, 185, 211, 215, 218, 316, 361

Drills, Portable Electric. 41, 48, 49, 183, 229, 372

Drills, Portable Pneumatic. 41, 261

Drives. 255, 270

Drives, Motor. 340

Dust Control Equipment. 3, 206, 283, 372

— E —

Ejection Sets, Air. 163

Engines, Diesel. 47

Engraving Machines. 164, 277, 333

Etchers. 283

Extensions. 243

— F —

Feed Fingers. 145

Feed Units. 189, 233, 246, 252, 274, 338

Files. 139, 218, 304

Files, Rotary. 15, 115

Filing Machines. 283

Filters. 335

Finishing Machines, End. 147

Flame Hardening Machines. 8, 9

Flexible Shaft Equipment. 15

Floats. 309

Furnaces, Heat-Treating. 127, 132, 178, 242, 334, 349, 369

— G —

Gage Blocks. 121, 249

Gage Handles. 120

Gages. 39, 97, 117, 121, 125, 129, 185, 217, 218, 249, 257, 325, 346

Gage Supplies. 120

Gear Checking Instruments and Machines. 16

Gear Cutting Machines. 296

Gear Measuring Instruments and Machines. 249

Gears and Gear Units. 51, 77, 193, 245, 260

Grinders, Abrasive Band and Disc. 236

Grinders, Abrasive Belt. 51, 267, 271, 310

Grinders, Air. 146, 335

Grinders, Bench. 41, 51, 183, 229, 275, 315, 371

Grinders, Cam. 106, 107

Grinders, Carbide Tool. 267

Grinders, Centerless. 10, 12, 13, 51

Grinders, Chaser. 248

Grinders, Contour. 51, Third Cover

Grinders, Cutter and Tool. 8, 9, 35, 43, 157, 161, 267, 371

Grinders, Disc. 17, 371

Grinders, Drill. 35, 43, 157, 321

Grinders, Face. 183

Grinders, Face Mill. 35

Grinders, Internal. 325

Grinders, Knife. 347

Grinders, Lathe Type. 371

Grinders, Pedestal. 248, 267, 287, 341, 371

Grinders, Plain. 12, 13

Grinders, Portable Electric. 48, 49, 115, 372

Grinders, Portable Pneumatic. 261

Grinders, Profile. 8, 9, 256

Grinders, Saw. 317

Grinders, Snagging. 371

Grinders, Special Purpose. 12, 13

Grinders, Surface. 129, 157, 211, 248, 275

Grinders, Swing Frame. 170, 296

Grinders, Thread. 343

Grinders, Universal. 12, 13

Grinders, Valve Seat. 183

Grinding Fixtures and Attachments. 72

Grinding Wheels. 7, 26, 32, 62, 81, 183, 186, 187, 211, 219, 251

Guards, Press. 343

— H —

Hammers, Portable Electric. 41

Hammers, Portable Pneumatic. 41

Hand Tools, Power (Look for specific item)

Handles, Hammer. 314

Handles, Machine. 264, 301

Handwheels. 264, 301

Hardness Testing Devices. 59, 228, 250

Hinges. 240, 314

Hobbing Machines. 134, 135

Hobs. 77, 99, 134, 135, 215

Holders, Boring Bar. 341

Holders, End Mill. 224, 335

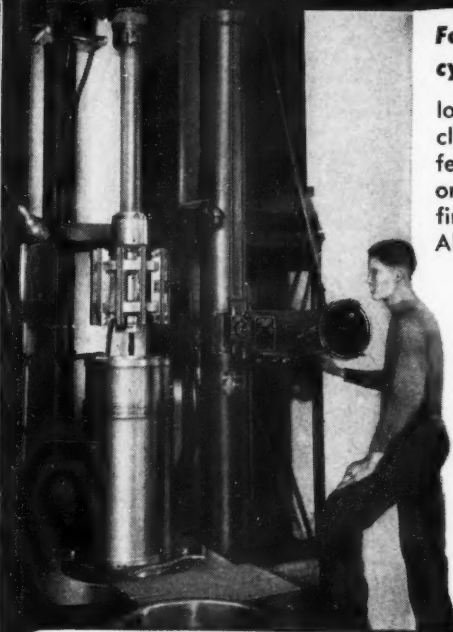
Holders, Floating. 153

Holders, Magnetic. 319

Holders, Tool. 118, 123, 313

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Holdern, Type, 116
Holdern, Wheel, 62
Honing Machines, 220, 260, 355
Hydraulic Equipment (Look for specific item)

— I —

Indexing Heads, 285
Indicators, 113, 217, 257, 316, 339

— J —

Jacks, 46
Jig Bore, 95, 171, 265
Jigs and Fixtures, 65, 264
Joints, Universal, 243, 245, 318

— K —

Keys, Machine, 279, 289
Keys, Socket Screw, 239
Keys, Woodruff, 279, 289
Keyway Cutting Machines, 246, Third Cover
Knives, Band, 29, 113
Knobs, Machine, 264, 301, 308

— L —

Lathes, Automatic, 19, 23, 152 A, B, C, D
Lathes, Bench, 159, 269
Lathes, Engine and Toolroom, 19, 43, 55, 60, 61, 104, 159, 246, 277, 289
Lathes, Spinning, 165
Lathes, Turret, 27, 152 A, B, C, D, 309
Layout Materials, 124, 305, 338, 340
Levers, 301
Lighting Equipment, 112, 268, 319
Light Wave Measuring Equipment, 249
Lubricants, 330, 333, 337
Lubricators, 335

— M —

Mandrels, Expanding, 309
Marking Machines, 172, 205, 316
Metallizing Equipment, 184, 225
Micrometers, 319, 325, 329
Milling Attachments, 40, 263, 269, 341
Milling Machines, Automatic, 58
Milling Machines, Bench, 234, 254
Milling Machines, Hand, 58, 227, 254
Milling Machines, Horizontal, 8, 9, 25, 30, 31, 43
Milling Machines, Profile, 247
Milling Machines, Turret, 263
Milling Machines, Universal, 8, 9, 25, 30, 31, 43
Milling Machines, Vertical, 8, 9, 25, 30, 31, 43, 234, 289
Mills, End, 99, 185, 215, 224, 335
Mills, Hollow, 303
Motors, 255, 315
Mounted Points and Wheels, 148
Mountings, Machine, 199

— N —

Name Plates, 172
Nibblers, 41, 210, 296
Notchers, 105
Notching Units, 70, 71
Numbering Heads, 205
Numbering Machines, 116, 172
Nut Drivers, 273
Nut Runners, Portable Pneumatic, 261
Nut Setters, Portable Electric, 41, 243
Nuts, 307, 308
Nuts, T, 216, 308

— O —

Oilers, 287, 341
Oil Groovers, 321, 325
Oils, Cutting, 8, 9, 141, 237, 284

— P —

Pans, Lathe, 298
Pantographs, 289
Parallels, 264, 297, 301, 341
Parters, Rod, 105
Parts, Machine, Aircraft, Production, Etc., 47, 279, 325, 351
Pillow Blocks, 245
Pins, 259, 279, 289, 307, 312
Pins, Stop, 156
Planers, 43
Plates, Surface, 119, 264, 341
Plugs, Pipe, 239
Pointers, Bar, 336
Polishing Machines, 41, 93, 267
Presses, Arbor, 309
Presses, Forcing, 46
Presses, Hydraulic, First Cover, 46
Presses, Power, 176, 246, 333, 337, 338
Presses, Punch, 44, 234, 246, 306
Presses, Straightening, 291
Presses, Sub, 296
Presses, Universal, 46
Processing Machines, Automatic Transfer, 38
Profiling Machines, 147
Pullers, 46
Pulleys, 270
Pumps, Coolant and Lubricant, 223, 365
Pumps, Hydraulic, 46
Pumps, Vacuum, 47
Punches, 272, 279
Punches, Bench, 105, 240
Punching Machines, 33, 128
Punching Units, Hole, 70, 71
Punch Press Sets, 308

— R —

Racks, Bar and Tube, 327
Racks, Machine, 289
Raker Sets, 282
Ratiomotors, 245



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JENKINTOWN 22, PENNSYLVANIA

Reamers, 99, 175, 185, 211, 215, 218, 299, 303, 345
 Rectifiers, 213
 Reductors, 245
 Regulators, 335
 Rests, 269
 Riveters, Portable and Hand, 262
 Riveting Machines, 53, 304, 321, 325
 Rolling Machines, 105
 Rolls, 232
 Rolls, Bending, 128

— S —

Safety Equipment, Press, 163
 Sanders, Portable Electric, 41, 48, 49
 Sanding Machines, 170
 Saw Blades, Band, 29, 113, 121, 125, 129
 Saw Blades, Hack, 29, 34, 113
 Saw Blades, Hole, 34
 Sawing Machines, Band, 52, 121, 125, 129, 165, 210, 283
 Sawing Machines, Circular, 64
 Sawing Machines, Friction, 128
 Sawing Machines, Hack, 34, 179, 213, 229, 279, 283, 333
 Sawing Machines, Miter, 326
 Saw Sharpening Machines, 317, 347
 Saws, Portable Electric, 41
 Saws, Portable Pneumatic, 41
 Scrapers, Hand and Power, 291
 Screw Drivers, Portable Electric, 41, 48, 49, 229, 273
 Screw Drivers, Portable Pneumatic, 41, 261
 Screw Machines, Automatic, 27, 38
 Screw Machines, Hand, 341
 Screws, Cap, Set, Socket and Machine, 160, 218, 239, 259, 307, 308, 313, Fourth Cover
 Screws, Transfer, 236, 336
 Services: Milling, Grinding, Lapping, Rebuilding, Repairing, Business, Etc., 298, 301, 317, 350
 Shapers, 91, 165, 333
 Shear, Punch and Copers, Combination, 128
 Shearing Machines, 33, 91, 105, 128
 Shears, Double Angle, 128
 Shears, Hand, 300, 347
 Shears, Portable Pneumatic, 261
 Sheet Floaters, First Cover
 Shims, 327, 331
 Slotting Machines, 43, 336, 347
 Sockets, 243
 Spacing Collars, Arbor, 348
 Spacing Table Machines, 95
 Special Machinery, 43, 64, 80, 93, 152 A, B, C, D, 188, 260, 264, 267
 Speed Reducers, 5, 122
 Spindles, 325, 351
 Spotters, 291
 Springs, Die, 259
 Sprockets, 245
 Staking Machines, 262
 Stamps, 172, 205, 285, 291, 331
 Steel, General Purpose, 359
 Steel Stock, Ground Flat, 113, 129

Steel, Tool, 74, 75, 121, 125, 173, 359
 Step Block Sets, 308
 Stock Stands, 210
 Stops, Finger, 156
 Straightedges, 341
 Straightening Machines, 274
 Strainers, 308
 Studs, 307, 308
 Stud Sets, 216, 308
 Stud Setters, 243
 Superfinishing Machines, 152 A, B, C, D
 Surfacing Machines, Abrasive, 165
 Switches, 213

— T —

Tables, Rotary and Index, 80, 126, 310, 326
 Taper Attachments, 338
 Tapes, Measuring, 113
 Tapes, Pressure Sensitive, 26, 32
 Tap Guides, 308
 Tappers, Portable Electric, 41
 Tappers, Portable Pneumatic, 41
 Tapping Heads, 15, 295, 323
 Tapping Machines, 65, 260, 324, Third Cover
 Taps, 15, 98, 185, 211, 215, 218, 241, 320
 Taps, Collapsible, 185
 Threading and Cutting Machines, Pipe, 2
 Threading Machines, 6, 65, 253, 296, 336
 Thread Rollers, Automatic, 93
 Tool Blanks, 74, 75, 260, 332
 Tools, Boring, 328
 Tools, Broaching, 78, 79
 Tools, Carbide, 50, 77, 131, 175, 232, 332
 Tools, Circular Cutting, 24, 297
 Tools, Dressing, 343
 Tools, Deburring, 276
 Tools, Engraving, 343
 Tools, Form, 77
 Tools, Honing, 355
 Tools, Radius, 195
 Tools, Special, 72, 99, 175, 215, 264
 Tools, Threading, 351
 Tools, Turning, 343
 Transmissions, Speed, 318
 Traps, Air, 309
 Turrets, Drill, 201
 Turrets, Lathe, 170, 218, 331

— V —

Valves, 42, 53, 96, 162, 274, 309
 Vise Jaws and Steps, 297
 Vises, Bench and Machine, 143, 213, 222, 263, 288, 301, 326, 327, 330, 332

— W —

Welding Equipment and Supplies, 280
 Wire, Measuring, 249
 Wrenches, 82, 243, 278, 332
 Wrenches, Portable Electric, 41
 Wrenches, Portable Pneumatic, 47

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13/64	12	9	1.76
7/32	12	9	1.76
15/64	12	9	1.95
1/4	12	9	1.95
17/64	12	9	2.05
9/32	12	9	2.05
19/64	12	9	2.25
5/16	12	9	2.25
21/64	12	9	2.50
11/32	12	9	2.50
23/64	12	9	2.75
3/8	12	9	2.75
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27/64	12	9	3.30
7/16	12	9	3.30
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15/32	12	9	3.60
31/64	12	9	3.60
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Over the Editor's Desk

THE owner of a small business establishment in Denver has met the Federal government in the field of competition and has lost. He's about ready to close up shop and "jine 'em." And after reviewing the facts in his case, it would seem he's almost justified in wondering whether we all shouldn't lay down our cares and get on the Federal payroll.

His worries started when a new Federal agency came to Denver and hired a lot of stenographers away from their regular jobs. "It took my secretary, Dorothy," he reports, "paying her \$2,650 a year to start, and giving her 26 days' vacation and 15 days' sick leave. I, who happen to be in a highly competitive field, cannot afford to meet these terms—and couldn't even if I wanted to."

He couldn't because the government has frozen prices on his merchandise—and thus, he points out, has limited his income. "And then," he moans, "in order to keep down inflation the government tells me I cannot pay the salary the government itself is offering Dorothy." But the lick that really got him was the latest news from Washington, in which the government was saying to him, in effect: "Because we're going to pay Dorothy more money than you could, we are going to increase your taxes again!"

This last blow is enough to make us all groan—for the new tax demanded by the President is for 10½ billion dollars and it would drastically add to the heavy tax load we're all already carrying.

Two facts are spotlighted by the Denver man's troubles:

(1) For the past 300 days, civilian employment in the Executive Branch has been increased at the rate of more than 1,000 people a day. The total civilian payroll on June 1 was 2,443,076—with salaries alone costing the taxpayers \$8 billion a year!

(2) We're paying nearly \$1,000,000,000 a year for unjustified idleness. Counting "sick leave," vacation time (five weeks) and holidays, most of the 2,443,076 employees get **10 weeks off every year at full pay**—at least six weeks more than non-government workers get.

"In my present condition," the Denver business man says, "I could certainly use a government job."

How long can we afford it?

George S. Benson, Harding College

WHEN a little more than a year ago the United Nations was plunged into the so-called police action and the United States embarked on a huge defense program, everyone in any way connected with the program knew that machine tools would be urgently needed to manufacture the weapons of war. That is, everyone seemed to recognize the vital role played by machine tools except some people in high authority in the defense program whose responsibility it was to authorize the allotment of materials on a priority basis.

Late last year, a Machine Tool Industry Advisory Committee was politely but firmly informed by General W. H. Harrison, head of the National Production Authority that, "We have more machines to cut up metal than we have metal to cut up." Materials were available, but the General insisted that the machine tool industry was of no greater importance to the defense program than the production of consumer goods and, consequently, deserved no greater portion of the available materials. Mr. J. D. Small, Chairman of the Munitions Board, confirmed these views at that time by asserting that since the nation had more machine tools now than it had in 1940, there would be no machine tool problem.

No one will ever be able to measure the valuable time that has been lost as a result of the views of these key men in our defense program. It is apparent at the present time, as it was nearly a year ago to members of the Machine Tool Advisory Committee that they were merely side-stepping the real issue.

Nearly a year has passed—months in which we could have made great headway. Action has come late, but it has come nevertheless this past month with Mr. Wilson issuing to a group of six government agencies a directive designed to break the "bottleneck" in the machine tool industry.

It is **now** evident, states Mr. Wilson, that the supply of metalworking tools, which are basic to achieving our production goals, is inadequate, and therefore, immediate steps should be taken to enable metalworking tools builders to devote their entire energies to production.

We will not forget the Machine Tool Advisory Committee's efforts many months ago to **avoid** the "bottleneck" we face today. We hope you won't either.

Maybe here he's out of place



...But in the shop he sets the pace

For fish, he'd do better in the butcher shop. But in his own shop the "line" he takes may "net" more profit to you.

He and men like him . . . plant managers, works managers, master mechanics, superintendents, general foremen and others . . . start the wheels moving to keep your factory wheels turning.

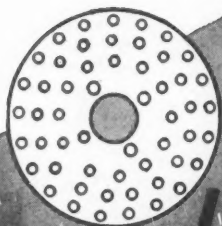
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INDEX TO ADVERTISEMENTS

— A —

Aber Engr. Works, Inc.	177
Ace Drill Bushing Co.	298
Acme Industrial Co.	312
Acme Tool Co.	258
Acorn Bearing Co.	299
Acromark Co.	172
Adams Co.	193
Aget-Detroit Co.	283
Albertson & Co., Inc.	183
Allegheny Ludlum Steel Corp.	74, 75
American Drill Bushing Co., Inc.	307
American Gas Furnace Co.	132
American Non-Gran Bronze Co.	350
American Pipe Bending Machine Co., Inc.	150
American Tool Works Co.	73
Ames Co., B. C.	217
Ames Precision Machine Works	228
Anderson Bros. Mfg. Co.	291
Apex Machine & Tool Co.	243
Armour & Co.	271
Armstrong-Blum Mfg. Co.	34
Armstrong Bros. Tool Co.	82
Atlantic Gear Works	260
Auto Engraver Co., Inc.	289
Auto Moulding & Mfg. Co.	314
Automatic Steel Products, Inc.	324
Automatic Valve, Inc.	162
Avey Drilling Machine Co.	30, 310, 311

— B —

Baker Bros., Inc.	Third Cover
Baldor Electric Co.	315
Barber-Colman Co.	134, 135
Barnaby Mfg. Co.	153
Barnes Co., Inc., W. O.	282
Barnes Drill Co.	151
Bartelt Engr. Co.	325
Bay State Abrasive Products Co.	81
Bay State Tap & Die Co.	241
Behr-Manning, Div. of Norton Co.	26
Behr Products Co.	291
Benchmaster Mfg. Co.	234
Bendix Westinghouse Automotive Air Brake Co.	166, 167

Besly & Co., Chas. H.	211
Beverly Shear Mfg. Co.	347
Billings & Spencer Co.	332
Blair Tool & Machine Corp.	338
Blanchard Machine Co.	62
Bloomfield Tool Corp.	314
Boston Gear Works	245
Bowser, Inc.	209
Boye & Emmes Machine Tool Co.	277
Brand Tool Co.	330
Brewster-Squires Co.	283
Bridgeport Machines, Inc.	263
Brighton Screw & Mfg. Co.	160
Brown Engr. Co.	327
Brown & Sharpe Mfg. Co.	28
Buckeye Tools Corp.	261
Buffalo Dental Mfg. Co.	342
Buffalo Forge Co.	33
Burke Machine Tool Co.	254
Busch Co., J. C.	341

— C —

Capewell Mfg. Co.	29
Carboloy Dept., General Electric Co.	66, 67
Carborundum Co.	219
Carroll Dividing Head Co.	304
Carroll & Jamieson Machine Tool Co.	104
Center Tool Co.	218
Chandler Tool Co.	114
Chicago-Latrobe Twist Drill Works	175
Chicago Pneumatic Tool Co.	47
Chicago Screw Co.	307
Chicago Tool & Engr. Co.	326
Chicago Wheel & Mfg. Co.	148
Cincinnati Bickford Tool Co.	95
Cincinnati Electrical Tool Co.	372
Cincinnati Gilbert Machine Tool Co.	76
Cincinnati Milling Machine Co.	8, 9
Cincinnati Milling Products Div., Cincinnati Milling Machine Co.	141
Cincinnati Shaper Co.	91
Circular Tool Co.	24
Clark Co., Robt. H.	327
Clark Instrument, Inc.	250
Cleveland Industrial Tool Corp.	336
Cleveland Tapping Machine Co.	324

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Index to Advertisements

Clipper Diamond Tool Co., Inc.	343
Commander Mfg. Co.	302
Commercial Centerless Grinding Co.	301
Comtor Co.	303
Conant Tool & Engr. Co.	317
Concentric Tool Corp.	339
Consolidated Machine Tool Corp.	43
Continental Machine Co.	281
Cook, Inc., L. H.	314
Cooley Electric Mfg. Corp.	334, 349
Criterion Machine Works	238
Crosman & Son, Inc., J. B.	248
Cross Co.	188
Crucible Steel Co. of America	173

— D —

D & M Guard Co.	343
Dahlstrom Mfg. Co.	308
Danly Machine Specialties, Inc.	37
Dayton Rogers Mfg. Co.	350
Dearborn, J. W.	345
Delaware Tool Steel Corp.	242
Delta-Rockwell Power Tool Div.	20, 21
Detroit Broach Co.	78, 79
Detroit Die Set Corp.	259
Detroit Power Screwdriver Co.	273
Detroit Reamer & Tool Co.	72
Detroit Stamping Co.	348
DeVlieg Machine Co.	171
Diversified Metal Products Co.	19
Dixon Crucible Co., Joseph	337
DoAll Co.	121, 125, 129
Doyle Vacuum Cleaner Co.	290
Dreile & Krump Mfg. Co.	244
Dremel Mfg. Co.	115
Dumore Co.	111
Durant Tool Supply Co.	287
Dykem Co.	124

— E —

Eastern Centerless Grinding Co.	350
Eclipse Counterbore Co.	50
Economy Machine Products Co.	313
Economy Tool & Machine Co.	346
Eisler Engr. Co., Inc.	298
Electro-Mechano Co.	142
Enco Mfg. Co.	319
Erickson Tools Div.	286
Everett Sales Co.	344

— F —

Farrel-Birmingham Co., Inc.	5
Federal Press Co.	176
Federal Products Corp.	257
Felters Co., Inc.	199
Fischer Machine Co.	321
Flynn Mfg. Co.	285
Foot-Burt Co.	36
Fosdick Machine Tool Co.	14
Fostoria Pressed Steel Corp.	268
Freyman & Sons, Inc., J. E.	343

Fulflo Specialties Co., Inc.	223
Fulmer Co., C. Allen	355

— G —

Galland-Henning Mfg. Co.	42
Gallmeyer & Livingston Co.	157
Gammans-Hoagland Co.	346
Gardner Machine Co.	17
General Pattern Works	350
Gillen Co., John	279
Gisholt Machine Co.	152 A, B, C, D
Globe Products-Heat Seal Corp.	341
Grant Mfg. & Machine Co.	304
Gray Machine Co.	296
Greaves Machine Tool Co.	350
Greenfield Tap & Die Corp.	185
Greenlee Bros. & Co.	38
Greenlee Tool Co.	323
Grinders & Fixtures, Inc.	285
Grob Bros.	283
Grobet File Co. of America	319

— H —

Hall Mfg. Co.	317
Hammond Mchry. Builders, Inc.	3
Hanchett Magna-Lock Corp.	203
Hanchett Mfg. Co.	347
Hanna Engr. Works	53
Hanson-Whitney Machine Div., Whitney Chain Co.	6
Hardinge Brothers, Inc.	145
Hartford Special Mchry. Co.	93
Hartmann Mfg. Co.	222
Heald Machine Co.	Second Cover
Helmann Mfg. Co.	236
Hendey Machine Co.	55
Herman Stone Co.	119
Heston & Anderson	310
High Speed Hammer Co., Inc.	262
Hisey-Wolf Machine Co.	371
Hjorth Lathe & Tool Co.	246
Hoggson & Pettis Mfg. Co.	285
Holo-Krome Screw Corp.	Fourth Cover
Houghton & Co., E. F.	237
Howald Machine Works, W. T.	329
Howe & Fant, Inc.	201
Huron Machine Products	120
Hutchinson Co., Wm. T.	260

— I —

Ideal Tool Co.	339
Independent Pneumatic Tool Co.	41
Industrial Products Suppliers	327
Industrial Tools	351

— J —

J & S Tool Co., Inc.	297
Jaco Devices	202
Jacobs Mfg. Co.	63
Jarvis Co., Chas. L.	15

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STONE Swing-Cut M14

32" x 34" bench model

- Full 3½ h.p. geared-in-head motor engineered with positive drive
- Cutting head swivels up to 45° in either direction for angle cutting.

CAPACITY

Ferrous and non-ferrous solids up to 1½" — pipe and structurals up to 2½".



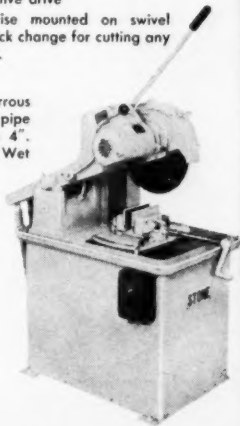
STONE Swing-Cut M16

Floor Model — Min. space required: 2½'x4'

- Full 5 h.p. geared-in-head motor engineered with positive drive
- Self-centering vise mounted on swivel plate permits quick change for cutting any angle up to 45°.

CAPACITY

Ferrous and non-ferrous solids up to 2½" — pipe and structurals up to 4". Can be equipped for Wet Cutting.



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STONE MACHINERY CO., INC.

302 Fayette St.

Manlius, N. Y.

Index to Advertisements

Jefferson Machine Tool Co.	170
Johnson Bronze Co.	181
Johnson Gas Appliance Co.	178

— K —

Kalamazoo Tank & Silo Co.	52
Kearney & Trecker Corp.	25
Kennametal, Inc.	332
Kent Machine Co.	336
Kling Bros. Engr. Works	128
Knight Mehry, Co., W. B.	11
Krome, Inc.	304

— L —

L & J Press Corp.	337
L-W Chuck Co.	213
Landis Machine Co.	2
Landis Tool Co.	12, 13
Lapeer Mfg. Co.	322
Last Word Sales Co.	329
Lees-Bradner Co.	253
Lemert Engr. Co.	321
Levin & Son, Inc., Louis.	269
Lewthwaite Machine Co., T. H.	279
Lima Electric Motor Co.	255
Lindberg Engr. Co.	127
Linley Bros. Co.	325
Lipe-Rollway Corp.	45
Littell Machine Co., F. J.	271
Littleford Bros., Inc.	298
Lodge & Shipley Co.	19
Logan Engr. Co.	159
Lovejoy Flexible Coupling Co.	318
Lovejoy Tool Co., Inc.	54
Luers, J. Milton	118
Lynn Mfg. Co.	331

— M —

M-B Products	335
Machine Products Corp.	264
Madison-Kipp Corp.	146
Manhattan Rubber Div.	251
Martin Machine Works, J. E.	332
Marvel Tool & Machine Co.	313
Master Mfg. Co.	40
Master-Taper Co.	338
Maurey Mfg. Corp.	270
McDonough Mfg. Co.	321
Mead Specialties Co.	233
Medelton Co., Inc.	341
Metal Carbides Corp.	232
Metallizing Co. of America	184
Metallizing Engr. Co., Inc.	225
Metzgar Co.	192
Meyers Co., Inc., W. F.	266
Michigan Chrome & Chemical Co.	338
Michigan Drill Head Co.	158
Mico Instrument Co.	277
Miller-Knuth Mfg. Co.	279
Miller Motor Co.	56, 57

Millers Falls Co.	220
Minnesota Mining & Mfg. Co.	32
Mitchell Co., E. C.	299
Modern Machine Tool Co.	221
Moline Tool Co.	260
Monarch Machine Tool Co.	60, 61
Montgomery & Co., Inc.	281
Moore Special Tool Co., Inc.	265
Morris Machine Tool Co.	32
Morse Twist Drill & Machine Co.	68, 69
Motch & Merryweather Mehry, Co.	64
Motor Tool Mfg. Co.	226
Mummert-Dixon Co.	296

— N —

National Tool Co.	77
National Twist Drill & Tool Co.	99
Nebel Machine Tool Co.	289
Neise, Karl A.	319
New Hermes, Inc.	164
New Method Steel Stamps, Inc.	331
Newman Mehry Co.	122
Nichols Engr. Co.	340
Nichols-Morris Corp.	58
Nicholson & Co., W. H.	309
Nicholson File Co.	139
Nielsen, Inc.	305
Nielsen Tool & Die Co.	336
Nobur Mfg. Co.	276
Northwestern Tool & Engr. Co.	308
Norton Co.	106, 107, 186, 187
Numberall Stamp & Tool Co.	116

— O —

OK Tool Co.	191
Oliver Instrument Co.	35
Oliver Machinery Co.	326
O'Neill-Irwin Mfg. Co.	105
Orlandi Gear & Machine Co.	16
Ottomiller Co., Wm. H.	218

— P —

Pedrick Tool & Machine Co.	18
Peninsular Chemical Products Co.	310
Perfex Gage & Tool Co.	117
Pines Engr. Co., Inc.	147
Pittsburgh Stamp Co., Inc.	291
Pivot Punch & Die Corp.	272
Pope Mehry, Corp.	161
Porter-Cable Machine Co.	51
Porter Machine Co.	350
Pratt & Whitney, Div. Niles-Bement-Pond Co.	247
Preis Engraving Machine Co., H. P.	333
Procurier Safety Chuck Co.	295
Production Devices, Inc.	320
Producto Machine Co.	143

— Q —

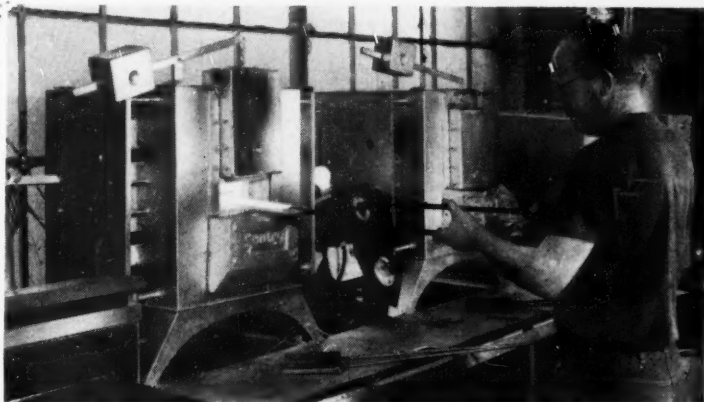
Queen City Machine Tool Co.	287
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Index to Advertisements

— R —

R. B. Tool Co., Inc.	328
Racine Tool & Machine Co.	179
Raybestos-Manhattan, Inc.	251
Reading Machine Co.	246
Ready Tool Co.	301
Reid Tool Supply Co.	301
Reltool Corp.	335
Rice Pump & Machine Co., Inc.	256
Richards Co., J. A.	212
Rivett Lathe & Grinder, Inc.	323
Roberts Rubber Co., Weldon	7
Rodgers Hydraulic, Inc.	46
Rogers Tool Co., John M.	303
Rouse & Co., H. B.	227
Royal Products Co.	345
Ruleta Co., Inc.	311
Ruthman Mehry, Co.	367

— S —

S & S Hinge & Metal Products Co.	240
Sales Service Machine Tool Co.	333
Sanford Mfg. Corp.	275
Savage Co., W. J.	210
Scherr Co., Inc., George	329
Schlecht & Son, L. G.	365
Schmidt, Inc., Geo. T.	205, 316
Schrader's Son, A.	163
Scientific Lubricants Co.	333
Seneca Falls Machine Co.	23
Sentry Co.	369
Service Machine Co.	306
Services Directory	350
Shore Woodwork Co.	314
Simmons Machine Tool Corp.	309
Skilsaw, Inc.	48, 49
Smith & Sons, Geo. W.	280
Snow Mfg. Co.	65
Speedgrip Chuck, Inc.	144
Sperman Metal Specialties	342
Stackblin Corp.	231
Standard Electrical Tool Co.	267
Standard Gage Co., Inc.	97
Standard Pressed Steel Co.	345, 357
Standard Steel Specialty Co.	289
Standard Tool Co.	215
Starrett Co., The L. S.	113
Steel Sales Corp.	331
Sterling Factory Equipment Co.	305
Stone Mehry, Co.	367
Strainer Products Corp.	308
Strong, Carlisle & Hammond Co.	239
Stuart Oil Co., D. A.	284
Sturdimate Tool Co.	281
Sundstrand Machine Tool Co.	152
Superior Hone Corp.	220
Superior Indicator Co.	316
Sutton Tool Co.	207
Syntron Co.	252

— T —

Taft-Peirce Mfg. Co.	39
Tamms Industries, Inc.	174, 305
Tap-Cartridge Co.	110
Teeter, C. B.	195, 330
Thomas Hoist Co.	315
Thriftmaster Products Corp.	323
Tietzmann Tool Corp.	216
Timesavers, Inc.	351
Toolkraft Corp.	287
Torit Mfg. Co.	206
Troyke Mfg. Co.	126
Tubing Appliance Co.	278
Twentieth Century Mfg. Co.	112, 156

— U —

U. S. Steel Supply Co.	359
Universal Engr. Co.	214

— V —

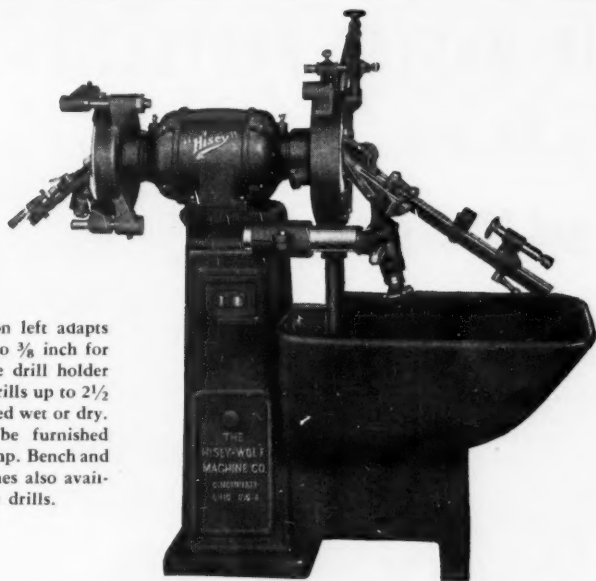
V & O Press Co.	338
Van Keuren Co.	249
Van Norman Co.	30, 31
Van Products Co.	326
Vascoloy-Ramet Corp.	133
Verson Allsteel Press Co., Inc.	First Cover
Victor Mehry, Exchange, Inc.	351

— W —

Wales-Strippit Corp.	70, 71
Walker Co., Inc., O. S.	235
Walker-Turner Div.,	
Kearney & Trecker Corp.	165
Walls Sales Corp.	236
Waltham Machine Works	296
Wardwell Mfg. Co.	317
Warner & Swasey Co.	27
Watts Bros. Tool Works	316
Waukesha Tool Corp.	299
Weldon Tool Co.	224
Wells & Sons, W. F.	210
Wesson Products Co.	123
Westinghouse Air Brake Co.	96
Whistler & Sons, Inc. S. B.	4
Whitney Mfg. Co., W. A.	240
Whitney Metal Tool Co.	300
Wicaco Machine Corp.	325
Wiedemann Machine Co.	44
Wilson Mechanical Instrument Co.	59
Wilton Tool Mfg. Co.	288
Winter Bros. Co.	58
Wittek Mfg. Co.	189
Wood & Spencer Co.	320

— Z —

Zagar Tool, Inc.	149
Zeh & Hahnemann Co.	246
Ziegler Tool Co., W. M.	313

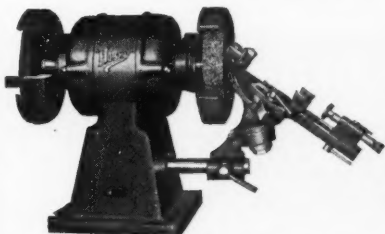


Small drill holder on left adapts drills from No. 60 to $\frac{3}{8}$ inch for dry grinding. • Large drill holder on right end is for drills up to $2\frac{1}{2}$ inches and can be used wet or dry. Machine can also be furnished without pan and pump. Bench and pedestal type machines also available for smaller size drills.

Drills MUST be Sharp and-- Correctly Ground

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gives increased flexibility allowing use of spacer blocks between lower and upper frames to give increased clearance from ends of spindles to top of table.

SPEEDS. Standard machine spindle speed range is from 76 RPM to 614 RPM. For heavier boring or facing operations the machine can be furnished with slow speed top driving gears, giving a spindle speed range of from 27 RPM to 220 RPM. To secure slower speed range, only a top driving gear change is necessary.

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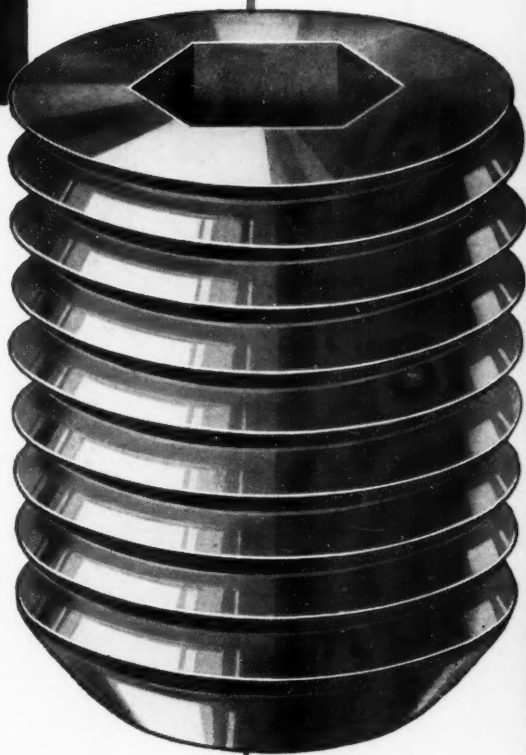
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